Border Lives

Health Status in the United States-Mexico Border Region

United States-Mexico Border Health Commission

The mission of the United States-Mexico Border Health Commission (BHC) is to provide international leadershp to optmize health and quality of life along the United States-Mexico border.

Providing Leadership on Border Health Issues to—

Facilitate Identification, Study, and Research

Be a Catalyst to Raise Awareness

Promote Sustainable Partnerships for Action

Serve as an Information Portal

April 2010

Note: This report contains information and data applicable only to the U.S. border area.

Border Lives
Health Status in the United States-Mexico Border Region

The United States-Mexico border region is a unique and dynamic area where various cultures come together and interrelate across geopolitical boundaries. Though the residents may possess different economies and politics, they share a common culture, language, environment, and health disparities.

—Border Health Research, National Latino Research Center, 2004

Editor's note: The information, data, and views published in this report represent the work of the contributing authors and do not necessarily reflect those of the United States-Mexico Border Health Commission or the organizations whose contributors have made this report possible.

United States-Mexico Border Health Commission

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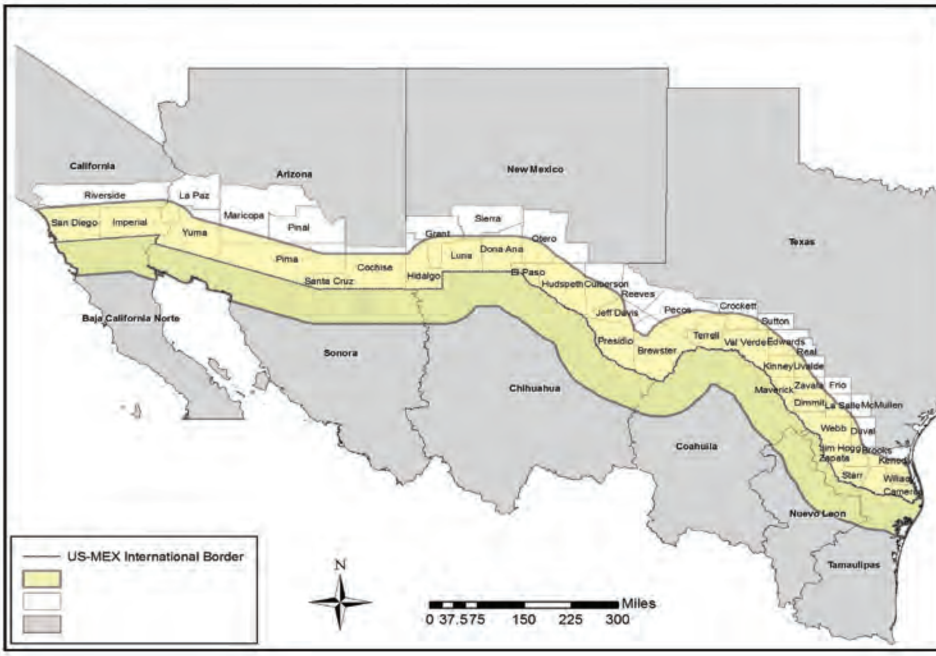

ARIZONA
1. Cochise
2. Pima
3. Santa Cruz
4. Yuma

CALIFORNIA
1. Imperial
2. San Diego

NEW MEXICO
1. Doña Ana
2. Grant
3. Hidalgo
4. Luna
5. Otero
6. Sierra

TEXAS
1. Brewster
2. Brooks
3. Cameron
4. Crockett
5. Culberson
6. Dimmit
7. Duval
8. Edwards
9. El Paso
10. Frio
11. Hidalgo
12. Hudspeth
13. Jeff Davis
14. Jim Hogg
15. Kenedy
16. Kinney
17. La Salle
18. Maverick
19. McMullen
20. Pecos
21. Presidio
22. Real
23. Reeves
24. Starr
25. Sutton
26. Terrell
27. Uvalde
28. Val Verde
29. Webb
30. Willacy
31. Zapata
32. Zavala

Border Area: Defined in P.L. 103-400 (22 U.S. Code, 290 n-5) and the La Paz Agreement of 1983, as the area 100 kilometers (62 miles) north and south of the United States-Mexican border. This area includes 80 *municipios* in 6 Mexican States and 48 counties in 4 U.S. states. For the purposes of the Healthy Border 2010 initiative, the border definition is limited <u>only to the 44 U.S. border counties</u>, excluding Maricopa, Pinal, and La Paz in Arizona and Riverside County in California. The terms "area" and "region" are used interchangeably.

Border States: In the U.S. the states are Arizona, California, New Mexico, and Texas. In Mexico, the states are Baja California Norte, Chihuahua, Coahuila, Nuevo León, Sonora, and Tamaulipas.

EXECUTIVE SUMMARY

This report provides an overview of key health indicators affecting U.S. residents living in the U.S.-Mexico border region. The report uses the definition of the border region adopted by the U.S.-Mexico Border Health Commission, which designates the U.S. portion of the border region as the area extending 100 kilometers (62 miles) north of the U.S.-Mexico border. Because most health, demographic, and economic information is available on a county basis, the U.S. border area is defined to include 44 counties that are entirely or partly within the 62-mile zone in the four border states of California, Arizona, Texas, and New Mexico.

In 2003, the U.S.-Mexico Border Health Commission published *Healthy Border 2010: An Agenda for Improving Health on the U.S.-Mexico Border*. That report was developed to identify key border health issues and to introduce Healthy Border 2010. Those key issues are addressed in this document, with a focus on the specific objectives of Healthy Border 2010.

Data presented in this document provide critical information for the use of policy makers, public health professionals, researchers, community members, and all others working to improve the health of border residents. Health and related data from a wide range of sources were used as the basis for each chapter's focus on a major challenge to the health of the border population. The data-centric approach of this report makes it the most comprehensive report available on the health status of U.S. border residents.

Key Findings

As data for this report were examined, several key themes emerged. Many of these themes cut across all chapters in this report, suggesting that achievement of Healthy Border 2010 objectives will require an integrated, systems-level approach. These themes are as follows:

- Despite high poverty rates, complex barriers to accessing health care, multiple socioeconomic, cultural, and environmental challenges, and a complex political and regulatory environment, the border population fares surprisingly well on several leading health indicators, including maternal, infant, and child health and heart disease and stroke. However, the border population is disproportionately affected by diabetes mellitus, cervical cancer, certain communicable diseases including tuberculosis, and certain unintentional injuries including unintentional poisonings.
- The rapid growth of the border population poses multiple challenges to development of a sufficient health workforce in the border region and access to primary, preventive, and specialty care.
- In the border region, socioeconomic factors, linguistic and cultural barriers, low population densities, and lack of health insurance combine to impede residents' ability to access health care. Barriers to access are particularly acute for Hispanic border residents.
- There is a critical need for increased surveillance and tracking of communicable diseases, environmental factors, and other influences on health.
- There is a need for standardization of data to ensure compatibility with data being collected by border states on both sides of the U.S.-Mexico border, as well as by both nations.
- Public health infrastructure is sorely needed throughout the border region, including educational and research institutions that can train culturally-competent health care providers.
- While many successful public health programs have been implemented in the border region, these programs are rarely replicated. In addition, lack of coordination between programs, funded from a variety of sources, presents challenges to public health professionals and the communities they serve.

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ACKNOWLEDGEMENTS

The United States-Mexico Border Health Commission (BHC) wishes to thank Rosaly Correa-de-Araujo, M.D., M.Sc., Ph.D., Deputy Director, Office on Disability, Office of the Secretary, U.S. Department of Health and Human Services (HHS) for her overall review and coordination during the latter stages of the report development and writing; Francis C. (Sam) Notzon, Ph.D., Director, International Statistics Program, National Center for Health Statistics, who brought reality to the vision for this report and for his long-term coordination and marshalling of the report writing team; Renée T. Despres, Ph.D., for her consultant editorial review of the initial versions of this report; Leah Hsu, M.P.H., International Health Analyst, and Julia S. Goldberg, M.P.H., International Health Analyst, Office of Global Health Affairs, HHS, for their support in editing early drafts of the report; and Daniel M. Reyna, M.S.S., M.P.A., General Manager, U.S. Section, U.S.-Mexico Border Health Commission, for his overall coordination of the completion of the report.

We would also like to acknowledge the long-term contributions of many of our partners, including Ronald J. Dutton, Ph.D., Director, Texas Office of Border Health, Texas Department of State Health Services; Paul Dulin, M.A., Director, New Mexico Office of Border Health, New Mexico Department of Health; Robert Guerrero, M.A., Director, Arizona Office of Border Health, Arizona Department of Health Services; and Maura Mack, Ph.D., former Director, California Office of Binational Border Health, California Department of Public Health.

We are also indebted to the members of the U.S. Section who were most encouraging and supportive throughout the period of work on this report.

The BHC also wishes to recognize the efforts of the following U.S. Section staff for their assistance in the completion of this project: Linda Willer, Communications Director; Lorraine Navarrete, Binational Coordinator; and Adriana Mota, Administrative Assistant.

INTRODUCTION

BORDER LIVES

The United States-Mexico border stretches 2,000 miles from the Gulf of Mexico to the Pacific Ocean. Defined in part by the Rio Grande river, the border has no other natural boundaries. Four U.S. states lie to the north of the border, and six Mexican states lie to the south. The area immediately to the north of the border includes parts of Arizona, California, New Mexico, and Texas. According to the 2000 U.S. National Census, approximately 6.5 million people live in the area, and 49 percent of those residents are Hispanic, mostly of Mexican origin. They mix with people of other ethnic groups throughout the border region, including non-Hispanic whites, blacks, American Indians, Asian-Americans, and others.

The border region is a complex milieu of cultures, peoples, languages, and traditions. Almost 800,000 people crossed the U.S.-Mexico border daily in the year 2000 (DOT, 2008), and economic exchange between the two countries is growing rapidly. Yet characterizing the border is no simple matter. Wealth contrasts with poverty, and dense urban areas lie adjacent to vast stretches of rural desert landscape. Nor is it a homogenous area. The problems and issues of one area may be contradicted by the characteristics of another, often neighboring, part of this unique region of the United States.

This social, cultural, economic, and political context provides the backdrop for the health and well-being of U.S. border residents. Border lives are characterized by complex and sometimes seemingly contradictory factors. It may seem difficult to paint the true picture of the border from a public-health perspective. Is it a bustling area engaged in international business, enjoying a healthy environment and good health outcomes? Or is it a poor region with few prospects for economic growth, suffering from environmental health risks, plagued with violent crime, frustrated with poor access to health care, and burdened with a variety of health problems?

Paradoxically, the answer is, "both." The border region is all of these things, a combination of the favorable and unfavorable that is difficult to summarize in a few words. The region is sorely lacking in health facilities and health workforce, and many border residents suffer from very poor access to health care. Border residents have high levels of obesity and diabetes, among other health problems. Nevertheless, the border population does well on other health measures including infant mortality, overall mortality, and deaths from the two leading causes, heart disease and cancer. Hispanics are the border residents who suffer the most from poverty and poor access to care, and in general have lower quality of health compared to non-Hispanics. However, they may do nearly as well and in some cases do better than their non-Hispanic neighbors on some health measures.

This report provides an overview of health issues in the border region, supported by health and related data from a wide range of sources. Each chapter considers a major challenge to the health of the border population. U.S. Public Law §103-400 defines the U.S. portion of the border region as the area extending 100 kilometers (62 miles) north of the U.S.-Mexico border. Because most health, demographic, and economic information is available on a county basis, this report defines the U.S. border area to include 44 counties that are entirely or partly within the 62-mile zone. This relatively restrictive definition excludes the interaction between border communities and large metropolitan areas just outside the boundary, such as Los Angeles, California, Phoenix, Arizona, and San Antonio, Texas. On the other hand, this restriction focuses the current study on the region most exposed to the forces that make the border area unique, namely, the binational social and economic ties that result from the large daily interchange of population.

The data-centric approach used in this report differs substantially from many other border reports, most of which tend to rely on local studies or projects, observations and personal experience (Bruhn, 1997; Power, 1998). A data focus has its advantages, as borderwide data can provide insights that are not perceptible in any single locality. But caution should be used in interpreting summary statistics. For example, combining data across 44 border counties produces averages that inevitably mask some of the variability of life within the border region. Average values also can be affected by a small number of counties. A case in point is San Diego County, California, which represents nearly half of the border population but is unlike most other border counties in many ways, particularly in terms of wealth and education. In some cases, borderwide averages that include San Diego County may conceal the situation in the remaining border counties, for example, in terms of average income or years of schooling. For these instances, we have presented the averages in two ways: first with San Diego County data included, and then without San Diego County data.

Providing detailed health data in terms of counties was especially challenging. In general, the largest array of health information is available at the national level, with the availability of data somewhat less for states, and even less information is available for individual counties. Ensuring that consistent definitions and data collection methods were used in all border counties further reduced the number of data sources. The small populations of many counties, and thus the small number of events (births, deaths, hospital discharges, etc.), made it difficult to provide statistically reliable data for each county. To provide the greatest level of geographic detail possible, we have included statistics for the entire border region and the border region of each state, in some instances combining several years of data to produce stable rates.

Healthy Border 2010

This report takes as its starting point a report published by the United States-Mexico Border Health Commission (BHC) in 2003, *Healthy Border 2010: An Agenda for Improving Health on the U.S.-Mexico Border*. While the report contained some health information for the border population, it was not intended to serve as an evaluation of health status in the border region; instead, it was developed to identify key border health issues and to introduce the BHC's Healthy Border 2010.[1]

The Healthy Border 2010 report contained background information on the health of United States and Mexican border residents, and focused on the specific objectives of the Healthy Border 2010 initiative. These objectives represented the core of the BHC's Healthy Border, which was established as the BHC's binational agenda of health promotion and disease prevention for the decade. Healthy Border 2010 uses the U.S. Department of Health and Human Services' Healthy People 2010 initiative as its framework. It also incorporates the United States' Healthy Gente initiative (Arizona Office of Border Health, 2004) and Mexico's *Indicadores de Resultado*/National Health Indicators (Secretariat of Health of Mexico, 2007).

The focus areas and objectives of Healthy Border 2010 are deliberately limited to a small number of variables for which data are currently available or are expected to be available in the near future. These are—

- *Access to Care*: Reduce the population lacking access to a primary health provider.
- *Cancer*: Reduce breast cancer and cervical cancer mortality.

1 The BHC has published in July 2009 the *Healthy Border 2010 Midterm Review U.S. Border Area*, a review of Healthy Border 2010 at mid-decade.

- *Diabetes Mellitus*: Reduce both the mortality rate of diabetes and the need for hospitalization.
- *Environmental Health*: Improve household access to sewage disposal and reduce hospital admissions for acute pesticide poisoning.
- *HIV/AIDS*: Reduce the number of cases of HIV/AIDS.
- *Immunization and Infectious Diseases*: Expand immunization coverage for young children, as well as reduce the incidence of hepatitis and tuberculosis.
- *Injury Prevention*: Reduce mortality from motor vehicle crashes as well as childhood mortality from injuries.
- *Maternal, Infant, and Child Health*: Reduce overall infant mortality as well as infant deaths due to congenital defects, improve prenatal care, and reduce teenage pregnancy rates.
- *Mental Health*: Reduce suicide mortality.
- *Oral Health*: Improve access to oral health care.
- *Respiratory Diseases*: Reduce the rate of hospitalization for asthma.

In its 2003 report, the Commission recognized the need for additional information for both sides of the border and encouraged the Mexico and U.S. Sections of the Commission to produce more in-depth reports on health status during the decade. The Mexico Section of the Border Health Commission published the first such report, *México: Frontera Norte Saludable*, in 2002. The present report is intended as a companion volume for the U.S. border population.

The Evolving Field of Border Health

> *Border health is a range of shared public health issues that span the international border and necessitates binational collaboration to be effectively addressed.*
>
> *—Health on the U.S.-Mexico Border: Past, Present, & Future; U.S. Department of Health and Human Services, July 2000*

As a programmatic area of public health, border health has slowly evolved in the United States. The first programs specifically targeting residents of the U.S.-Mexico border region began in the early 1940s. However, federal and state departments of health did not begin to focus on border health until the 1990s. Early interventions focused on the surveillance and prevention of communicable diseases, such as the prevention and treatment of sexually transmitted diseases. Border health programs now address a broad range of public health issues, including chronic diseases, environmental health, health emergency preparedness and response, and mental and behavioral health. Local, state, and federal government agencies and a host of advocacy organizations and universities are also involved in addressing the health needs of border residents.

In many instances, health disparities among border populations are more pronounced than in other parts of both the United States and Mexico. The lack of a uniform epidemiological baseline relative to demographics and health conditions among the differing cohorts that comprise the border population also restricts an accurate analysis of health disparities among these groups, as well as the efficient targeting of public health resources. While research has been useful to characterize health conditions and disparities in specific geographic areas and cohorts (for example, the Mexican-American population), results have generally, to date, not translated into significant programmatic changes in health systems applied at the state or federal level. This situation is further exacerbated as population growth and the ever-increasing rolls of the poor and uninsured are outstripping the capacities of health systems to meet public health demands.

Efforts to address health problems along the U.S.-Mexico border can be traced to 1942 when thousands of Mexican nationals were hired as temporary agricultural laborers to meet U.S. labor shortages during World War II (Collins-Dogrul, 2006). Under the *Bracero* Program, Mexican laborers wishing to work in the United States were required to complete a tuberculosis test as a condition to entering the country. Also in the early 1940s, the U.S. government first addressed sexually transmitted diseases in the border region. Soldiers from Fort Bliss in Texas and Camp Pendleton in California took many of their leaves in adjoining Mexican border towns, leading to high rates of sexually transmitted diseases. To avoid national sovereignty issues with Mexico, the U.S. Public Health Service requested that a transnational institution, the Pan American Health Organization (PAHO), open a U.S.-Mexico field office in El Paso, Texas. In effect, the PAHO Field Office was established and immediately initiated an education and testing program to reduce sexually transmitted diseases. The program included funds to establish diagnostic laboratories managed by Mexican health authorities in Nuevo Laredo, Juárez, and Mexicali, as well as staff training (Collins-Dogrul, 2006). These individual efforts soon led to the establishment of the first organizations dedicated to border health.

In 1943, PAHO held the first binational border health convention in Juárez. At that meeting participants supported the creation of a binational professional organization. As a result, the U.S.-Mexico Border Health Association (USMBHA) was established and housed at the PAHO Border Field Office in El Paso. Both PAHO and USMBHA helped bring together public health professionals and policy makers to coalesce around border health issues. Through the two organizations, practitioners began to participate in binational committees, regional councils, and working groups to address public health problems affecting residents in sister cities and along the entire extent of the U.S.-Mexico border.

Beginning in the late 1960s, economic and demographic pressures throughout Mexico, including the collapse of several Mexican states' agricultural models, prompted millions of Mexican nationals to move north to the larger sister-city areas of the border to fill ever-growing labor needs emanating from the development of the *maquiladora* ("twin-city" manufacturing and assemblage) industry and associated construction and service sectors. With the advent of the North American Free Trade Agreement (NAFTA) in 1994, trade between the United States and Mexico tripled and the total number of *maquiladoras* increased to more than 3,000. Cross-border movement of goods and workers grew concomitantly, further exacerbating health access issues. While NAFTA included environmental side agreements to address expected impacts caused by economic growth and infrastructure, the agreement did not include any public health provisions. In December 1994, shortly after NAFTA went into effect, the devaluation of the peso precipitated the 1995-1996 financial crisis in Mexico and collapse of the banking sector, leading to thousands of failed small and medium enterprises and enlarging the rolls of unemployed.

The confluence of both of these processes encouraged migrations of Mexicans to the border in numbers that outstripped the capacity of Mexican state public health authorities. Consequently, health disparities among low-income families and the unemployed increased dramatically, including increases in rate of infectious disease (especially tuberculosis and sexually transmitted diseases). As thousands of migrants were unable to find employment opportunities in Mexico, they continued north, crossing the border illegally and adding to the burgeoning population of undocumented immigrants in the United States, now estimated to exceed 12 million people. With the increased movement of millions of people back and forth across the border every day, the demand for health services has also grown on the U.S. side of the border, requiring county, state, and federal health authorities to respond to an ever-increasing number of uninsured, including the undocumented who are not eligible for many state and federally-sponsored health-coverage programs.

In 1983, the U.S. and Mexican governments signed the *La Paz Agreement on Cooperation for the Protection and Improvement of the Environment in the Border Area*, and accepted a definition of the shared "border region" as the geographic area defined by 100 kilometers (62 miles) north and south of the U.S.-Mexico border. While originally intended only to cover efforts at environmental protection and natural resources conservation in the border region, this definition was later adopted by other federal and state authorities for any planning and implementation of activities with a binational perspective, including public health.

The border states responded with the establishment of their respective offices of border health. The Texas, New Mexico, and California offices opened in 1993, and the Arizona office in 1994 (Collins-Dogrul, 2006). State and county governments developed special legislation and appropriations to cover the costs of providing health care to indigents, including housing and health services. San Diego County and Imperial County opened their own border health offices in 1997 and 1998 respectively, while other county governments established *colonias* task forces and programs to provide basic human services (especially water and wastewater) and health care in these communities. Initially, most of the programming in border health concentrated on the 15 sister-city pairs, where approximately 90 percent of the border population resides.

Public Law §103-400 (1994) also authorized the President of the United States to establish an agreement with Mexico to create a binational commission to address the serious health problems in the border region. At the federal level, the Health Resources and Services Administration (HRSA) initiated its Border Health Program in 1996 to address health access issues in the border region, and in 1997, Congress approved funding for a commission through the U.S. Department of Health and Human Services (HHS).

As a result, the U.S.-Mexico Border Health Commission (BHC) was established in July of 2000. The agreement went into effect for five years and is automatically extended for additional five-year periods unless either party gives notice of withdrawal. The BHC began to more formally and systematically address border health problems when it began operations at the offices of the U.S. Section in El Paso and the Mexican Section within the Secretariat of Health Mexico City in 2001.

The U.S. Section established outreach offices in each of the four state offices of border health, through which it funds border health activities. Similar offices now exist in each of the six Mexican border states.

Since the mid-1990s, numerous projects and programs have been implemented in the border region. The departments of health of the four U.S. border states have taken the lead in implementing most of the programs through their respective offices of border health, with financial and technical support from HHS.

As a result of these efforts, several models of excellence have emerged as innovative and effective approaches to addressing specific border health challenges, and coordination has improved among U.S. and Mexican federal health authorities. Cooperation in handling local and regional priority public health issues has been especially notable between individual border states and "sister cities."

As public health systems continue to evolve and develop innovative approaches that recognize the unique multicultural and socioeconomic character and challenges of the border population, the evolving field of border health will continue to move forward and provide solutions to the benefit of all border residents along the U.S.-Mexico border region.

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Organization of the Report

Each chapter provides a comprehensive view of the impact of a particular issue on border health and considers how those challenges to border health might be addressed.

The chapter on the U.S. border population documents the significant increase in border residents in recent years and projects that growth into the future; it also considers the ethnic composition of the border population. A number of other chapters discuss the impact of a rapidly growing border population on specific health issues. Likewise, the division of the border population into its two major ethnic groups, Hispanics and non-Hispanic whites, figures prominently in every chapter.

The large daily interchange of populations across the international border is a second common theme. Residents of both countries cross the border for a variety of reasons, including work, shopping, health care, visits with friends or relatives, and others. This cross-border traffic is essential to the economies of communities on both sides of the border. For communicable disease prevention however, border crossings present a major challenge to the identification and tracking of communicable disease cases, as well as ensuring that individuals under medical care complete the prescribed treatment regimens. Border residents from both countries frequently cross to "the other side" to seek health care, producing an impact on provision of care and patient workloads. The requirement that U.S. citizens will have to have a passport to gain reentry to the United States may reduce the level of border crossings. However, such reductions are unlikely to be major or permanent given the social and economic mandates of life in the border region.

One surprising finding is addressed in several chapters: favorable health outcomes for border Hispanics, including low death rates from heart disease and some cancers, and low rates of low birthweight and infant mortality. These findings seem to confirm the "Hispanic paradox," that is, good health outcomes despite poor access to care and low socioeconomic status (Scribner, 1996). Several chapters examine this issue and consider possible statistical explanations for this epidemiologic puzzle.

One of the most important issues for the border is ensuring access to health care for a rapidly growing population when a large portion of that population lacks health insurance and cannot afford to pay out-of-pocket expenses. Compounding this problem is the relatively slow growth of the border health workforce, which is not keeping up with the population increase. Both public and private health care systems will be challenged to deal with this very complex problem.

Chapter 1, "The U.S. Population at the Border," provides data on income and employment levels for border residents and describes the small population and low population density of many border counties. The chapter examines the rapid rise in population in the border region and provides basic data on each group, including important differences in population growth rates, income and education levels, and country of birth. The border region often is described as an area of open spaces, wide vistas and unpopulated expanses, yet more than 90 percent of the population live in urban areas – a higher rate than the U.S. average of 79 percent. The border population is rising rapidly, and this increase, combined with booming trade with Mexico – especially related to the maquiladoras or "twin plant" facilities in northern Mexico – have created an image of dynamic growth for the border region. At the same time, overall levels of poverty and unemployment are very high in the border area. Removing San Diego County, the wealthiest of the border counties, would make these poverty and unemployment measures even worse. The border population is characterized by the large proportion of Hispanics, most of Mexican origin, and a high percentage of foreign born residents. In terms of health issues, the Hispanic population are genetically predisposed to certain diseases. The high prevalence of diabetes in Hispanics is thought to be related to the American Indian contribution to their genetic profile (CDC, 1999). In addition, genetic predisposition, along with dietary deficiencies, might also explain the higher level of neural tube defects among Mexican-Americans (Suarez, 2000).

Chapter 2, "The Healthcare Workforce," examines the health workforce in the border region. This chapter describes the shortage of border health professionals and the need to increase the training of new health workers to respond to the rapidly growing border population. It also discusses challenges to retain health workers within the border counties and proposes some possible solutions to the growing shortage of health workers on the border.

In Chapter 3, "Access To and Use of Health Care," the lens turns to obstacles to health care access for border residents. This chapter documents the primary barriers to accessing health care using survey data on health insurance status of border residents, inability to pay for care out-of-pocket, and use of health care by border residents. Low income and lack of health insurance mean that Hispanics suffer disproportionately from a lack of access to health care, both in the border region and nationally. In addition, access to care is one of the important reasons for border crossings. U.S. residents seek less expensive health care and dental care, as well as traditional medicine or Spanish-speaking health-care providers in Mexico. Mexican residents travel to the United States to obtain more specialized medical care than is available in Mexico for the treatment of chronic diseases and traumatic injuries, among others.

Fertility rates and birth outcomes are examined in Chapter 4, "Maternal, Infant, and Child Health." The data presented in this chapter indicate that, in the border region, Hispanics have much higher fertility than non-Hispanic whites. In addition, Hispanic birth outcomes such as birth weight and infant mortality are very good considering the low income, low levels of education, and poor access to care of border Hispanics.

Data on infectious diseases in the border region are presented in Chapter 5, "Communicable Diseases." The daily mixing of large numbers of U.S. and Mexican residents in border communities, along with poverty and other factors, contribute to high levels of communicable diseases in the border region. For example, the Border Counties Coalition reported in 2006 that if the 24 U.S. counties contiguous with the Mexican border were the 51st state, that state would rank second among the states in the incidence of tuberculosis. Yet, for many other communicable diseases, incidence rates in the border counties are lower than in the non-border areas of the four states and lower than national levels as well. The communicable disease chapter considers at length the impact of border crossings on disease transfer, along with the difficulties of identifying and tracking disease cases. Ensuring that individuals suffering from communicable diseases complete their prescribed regimen of treatment is another major concern. Several of the chapters focus on the need for improved access to care and screening, including the chapters on diabetes, cancer, heart disease, and mental health. Likewise, several chapters in this section discuss the possibility of genetic explanations for certain chronic diseases, such as diabetes.

Chapter 6, "Breast and Cervical Cancer," provides an overview of the impact of breast and cervical cancers, as well as other cancers, on the population living in the border region. Cancer prevalence and death rates are thought to be highest in minority populations, yet while Hispanics suffer greater mortality from cervical cancer than non-Hispanic whites, their breast cancer mortality is lower than the non-Hispanic white rate. Nevertheless, cancer remains the second leading cause of death for border residents, both Hispanics and non-Hispanic whites. Low rates of screening and treatment often lead to cancer being diagnosed at later stages, when it is more aggressive. Limited access to health care services, along with language and cultural barriers, are important reasons for late diagnosis of cancer in border residents (Tsui, Saraiya, Thompson, et al., 2007).

Diabetes mellitus is a rapidly growing problem throughout the United States, and the border region is among the areas most affected by growing prevalence of this disease. Both Hispanics and Native Americans are more susceptible to type-2 diabetes mellitus. Chapter 7, "Diabetes," examines the impact of diabetes on border residents and calls for additional research, support for collaborative efforts, and policies to emphasize diabetes prevention and education.

Chapter 8, "Heart Disease and Stroke," reviews the available information on heart disease and stroke in the border region, including levels and trends, morbidity and mortality, and prevalence of risk factors. Although heart disease is the leading cause of death in both the United States and the U.S.-Mexico border region, the border mortality rate is significantly lower than the national rate. One surprising finding of this analysis was lower death rates due to heart disease and stroke among Hispanics than non-Hispanic whites, despite higher levels of certain risk factors for Hispanics, such as obesity, diabetes, and uncontrolled hypertension. While this finding seems to confirm the theory of the Hispanic paradox, the chapter also reviews several longitudinal cohort studies that raise questions about the Hispanic advantage in heart disease and stroke.

Newspaper articles and television reports highlight violent crime in border communities, especially events related to illegal drug traffic and human smuggling. Yet, as documented in Chapter 9, "Injuries," the homicide rate in the border counties is substantially below the national level. Crime reports show increases in violent crime for some border counties in recent years but declines in others, including some of the largest counties (Bureau of Justice Statistics, 2007).

In addition, downward trends in violent crime for the four border states mirror the national decline in violent crime since 1990. The chapter summarizes available information on injury-related mortality in the border region. Among the key findings of the analysis were major differences between border Hispanics and non-Hispanic whites in mortality from various causes of injury, and significantly higher injury death rates in the border areas of Arizona and New Mexico as compared to the border counties of California and Texas.

Mental well-being is the foundation for overall health and the ability to function in society. Chapter 10, "Mental Health," examines data on the prevalence of mental illness, illicit substance use, and patterns of utilization of mental health and substance use services in the U.S.-Mexico border region. While many similarities were found in mental health status across ethnic groups, important differences emerged when data were disaggregated by ethnicity. Nationally, a greater proportion of people born in the United States, both Hispanic and non-Hispanic, reported psychological distress and major depression compared to their immigrant peers; although within the border region there was no significant difference between the native-born and immigrants for the same measures. Data on use of mental health services indicates that nationally and in the border region, Hispanics are particularly underserved by mental health providers.

The health problems of the border are numerous and complex and are unlikely to be solved in the near future. Border communities are searching for and developing innovative solutions to many of these problems. For instance, foreign-born border residents, especially those from developing countries, often are poorly educated and have limited English language ability. Communicating health promotion and health education to this group is challenging and requires imaginative solutions. One of the more successful techniques for health outreach to this group has been through *promotoras*, or lay health workers, an approach used successfully in many developing countries (Ford, 1998). This type of cross-fertilization between domestic and international programs may yield other innovative strategies in the future and needs to be supported by policy development and funding.

The chapters that follow provide information on the health status of the border population, including data on the extent and severity of many border health problems. It is our hope that the information provided in this report will assist policymakers, public health agencies, private foundations and others to improve the design and efficacy of health programs and projects for the population of the U.S.-Mexico border region.

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CHAPTER 1

THE U.S. POPULATION AT THE BORDER

In most discussions of health status, population issues serve only as an introduction or background to health topics. But population issues have an important bearing on many aspects of health, including the ability to access and pay for health care, the likelihood of developing chronic disease, environmental exposures, diet and other risk factors. Population issues directly affect almost all Healthy Border 2010 objectives.

According to the 2000 U.S. Census, more than 6.5 million people reside in the 44 U.S. counties within 100 kilometers of the Mexican border. Due to climate, terrain, the availability of water, and other issues, the border population is overwhelmingly urban and largely located close to the border with Mexico. The region experienced rapid population growth beginning in the 1980s (U.S.-Mexico Border Health Commission [BHC], 2003). This growth was related in part to strengthened economic ties between the United States and Mexico under the North American Free Trade Agreement (NAFTA), which created work opportunities in urban areas along the U.S.-Mexico border. In fact, almost all of the U.S. border population lives in or near "sister cities" – the U.S. cities linked economically, socially and culturally to neighboring Mexican border cities. The interdependency between U.S. and Mexican border cities is underscored by the roughly one million northbound border crossings that occur each day for work, shopping, family visits and other reasons (Freeman, Gomez-Dantes, & Frenk, 1995).

Methods

This chapter describes the population of the U.S. region near the border with Mexico, various characteristics of that population, and recent population trends. The population issues covered in this chapter include: population size, distribution, and growth; population distribution by age and race/ethnicity;

socioeconomic status of the border population; English language ability of the border population; and the proportion of foreign-born residents among the border population.

Information presented in this chapter was obtained primarily from the 2000 decennial census. For some topics, data from the 1990 census were added in order to provide trends (Census 2000 Gateway, 2007). Census Bureau population data for recent years allow respondents to claim more than one race, conforming to the 1997 Office of Management and Budget (OMB) standards for the collection of data on race and ethnicity (OMB, 1997). Because many U.S. states continue to request only a single race for birth and death registration, it was necessary to modify the census population counts and estimates for recent years to produce denominators needed to calculate vital rates. The modified census data, known as bridged-race estimates, were prepared by the National Center for Health Statistics in collaboration with the National Cancer Institute and the Census Bureau (Ingram, 2003). Bridged-race estimates also facilitate the presentation of race-specific data.

Population Distribution

The distribution of border residents within the 44-county area is far from even and this uneven distribution impacts these residents' health, especially in terms of access to health care. California and Texas claim the largest proportions of the border population, with fewer residents in Arizona and only a small percentage in New Mexico. **Table 1** shows the distribution of the population in the border region. With more than 91 percent of the population residing in urban areas, the border region is significantly more urbanized than the United States as a whole. Nationwide, 79 percent of the population lives in urban areas. The urban proportion of the border population increased slightly over the last decade of the twentieth century, from 88.5 percent in 1990 to 91.3 percent in 2000. In addition, a large proportion of the border population is located in just a few areas. San Diego County alone accounts for 43 percent of the total, with Pima and El Paso counties each claiming more than 10 percent of the total. The residents of these three counties represent almost two-thirds of the total border population.

The remainder of the U.S. border population is distributed among the remaining 41 counties, most of which cover very large geographic areas. Thus, despite a large and growing total population, the number of residents per square mile is extremely low in many border counties, particularly in New Mexico and Texas. Eighteen border counties have fewer than five residents per square mile and seven have less than one resident per square mile (see **Figure 1**). The Texas counties of Kenedy and McMullen each have fewer than 1,000 residents, comprising roughly 0.01 percent of the total border population. Kenedy County has 414 residents or less than 0.5 inhabitants per square mile.

The combination of high and low population density creates problems for health resources in both areas. In urban areas, high population density strains existing health-care resources and public health infrastructure. In rural and frontier areas, extremely low population densities translate into long distances to the nearest physician's office or hospital. Several U.S. border counties do not have a single hospital, clinic, or physician's office. For a detailed discussion of health workforce issues, see Chapter 2, "The Healthcare Workforce."

	Total	Percent growth, 1990-2000	Percent Total	Percent Urban	Percent Rural
United States	**281,421,906**	**13.2**	**100.0**	**79.0**	**21.0**
Border States	**61,673,146**	**18.8**	**100.0**	**89.3**	**10.7**
Arizona	5,130,632	40.0	8.3	88.2	11.8
California	33,871,648	13.8	54.9	94.4	5.6
New Mexico	1,819,046	20.1	2.9	75.0	25.0
Texas	20,851,820	22.8	33.8	82.5	17.5
Border counties	**6,553,766**	**20.0**	**100.0**	**91.3**	**8.7**
Arizona border	**1,159,908**	**28.4**	**17.7**	**87.6**	**12.4**
Cochise	117,755	20.4	1.8	66.4	33.6
Pima	843,746	26.3	12.9	91.6	8.4
Santa Cruz	38,381	28.4	0.6	68.1	31.9
Yuma	160,026	48.6	2.4	86.9	13.1
California border	**2,956,194**	**12.7**	**45.1**	**95.6**	**4.4**
Imperial	142,361	28.3	2.2	85.5	14.5
San Diego	2,813,833	12.0	42.9	96.1	3.9
New Mexico border	**312,200**	**25.5**	**4.8**	**72.9**	**27.1**
Dona Ana	174,682	29.2	2.7	79.6	20.4
Otero	62,298	20.3	1.0	71.0	29.0
- Other NM border	75,220	21.7	1.1	59.1	40.9
Texas border	**2,125,464**	**26.1**	**32.4**	**90.0**	**10.0**
Cameron	335,227	28.1	5.1	87.1	12.9
El Paso	679,622	14.0	10.4	96.9	3.1
Hidalgo	569,463	47.2	8.7	93.4	6.6
Maverick	47,297	35.6	0.7	88.4	11.6
Starr	53,597	31.1	0.8	78.7	21.3
Val Verde	44,856	16.3	0.7	89.9	10.1
Webb	193,117	43.6	2.9	95.6	4.4
- Other TX border	202,285	5.4	3.1	59.8	40.2

***Table 1*: Population by various characteristics, U.S.-Mexico border, 2000**

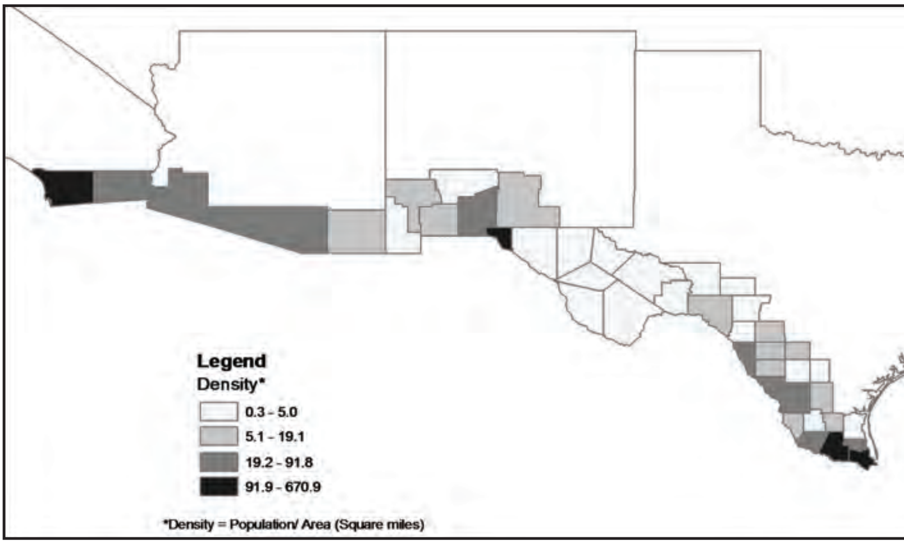

***Figure 1*: Population density, U.S.-Mexico border, 2000**

Source: U.S. Census Bureau, 2000 Census, Summary File 1

Population Growth

Rapid population growth also is straining health resources in the border region. The population in the 44 border counties has grown rapidly since 1970. Between 1970 and 2000, the border population more than doubled, from 3.1 million to more than 6.5 million inhabitants. Table 1 shows the percent of population growth, and Figure 1 illustrates the population density throughout the border region. Although the growth rate slowed somewhat during the 1990s, the border population still grew by 20 percent from 1990 to 2000, while the total U.S. population grew by 13 percent. As **Figure 2** illustrates, if growth trends of the 1990s continue, the U.S. border population will reach 8 million in 2010 and 9.8 million by 2020.

Not all U.S. border counties grew at the same rate during the 1990s, and some counties even experienced negative population growth. Certain border counties grew rapidly over the decade, with increases of 40 percent or more in three counties: Yuma County, Arizona, and Hidalgo and Webb counties in Texas. Growth of 25 percent or more was recorded in seven other border counties. Two of the largest border counties — San Diego, California, and El Paso, Texas — reported much lower growth rates for the decade: 12 percent and 14 percent, respectively. Eleven of the smaller border counties lost population between 1990 and 2000.

Population growth in the border region is fueled by a number of factors. Growing economic trade with Mexico is an important stimulus, but not the

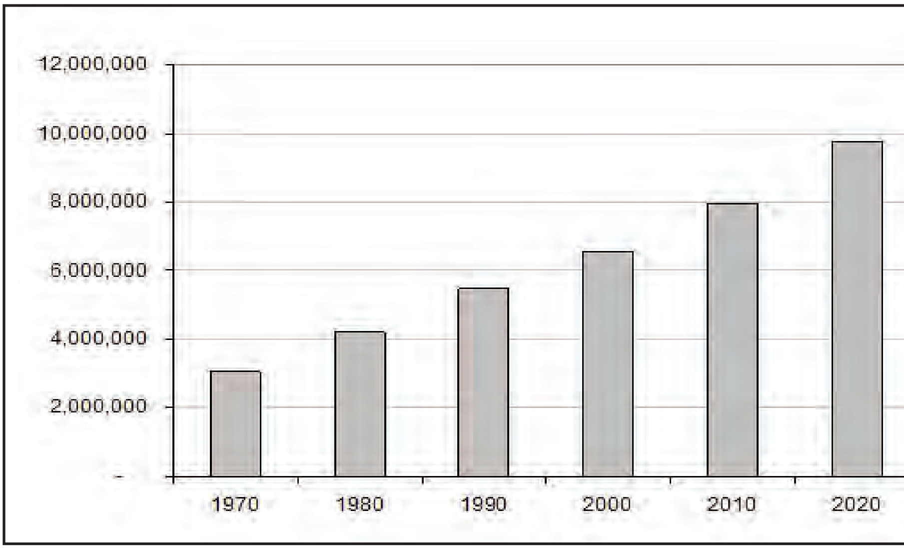

***Figure 2*: Population trends, U.S.-Mexico border, 1970-2020**

Source: 1970-2000: U.S. Census Bureau; 2010-2020: projection using 1990-2000 average annual percent growth rates

only one. Favorable weather and a lower cost of living are a great attraction to migrants, including many U.S. retirees who have relocated to border counties. The elderly population of the border is growing faster than the total population. From 1990 to 2000, the population aged 65 years or more grew by 26 percent, compared to 12 percent for the nation and 19 percent for the four border states. Growth of the elderly population was especially rapid in the border areas of New Mexico (42 percent increase), Arizona (37 percent), and Texas (35 percent). Because of greater use of health services by the elderly, continued rapid growth of this age group will place a heavy burden on border health resources. In addition, the aging population is likely to lead to a growing prevalence of chronic diseases in the region.

The high birth rate in many parts of the border region is another important contributor to population growth. Continued rapid population growth will strain many border resources, not least the supply of physicians, nurses, and other health personnel. Rapid population growth also will require substantial public and private investment to ensure adequate educational services, housing, safe water supplies, and other resources that provide the foundation for healthy communities.

Age Distribution

Overall, the age distribution of the U.S. border population is younger than that of the total U.S. population, but the border age distribution is affected by three major trends. First, the movement of retirees to the region adds to the proportion of elderly. Second, the migration of individuals seeking work increases the working-age population. Third, the high birth rate in many border counties leads to a relatively high proportion of children. The impact of these trends on age distribution varies substantially by ethnic group.

Figure 3 and **Figure 4** contain population pyramids that present the age and sex distributions on a percentage basis for the 44 border counties combined and the United States. The border pyramid shows a slightly younger population, with almost 32 percent of the population below 20 years of age, as compared to about 29 percent for the United States. The proportion of elderly (age 65 years or more) is similar in both populations, at 11 percent for the border region and 12 percent for the United States. The border regions of the four border states also have differing age distributions, with Arizona and California reporting about 29 percent below age 20 while New Mexico and Texas have larger proportions in the young ages, at 33 percent and 37 percent respectively. Among the larger border counties, Webb County, Texas had the largest proportion of youth (39 percent under age 20) and Yuma County, Arizona had the largest proportion of elderly (16.5 percent aged 65 or more).

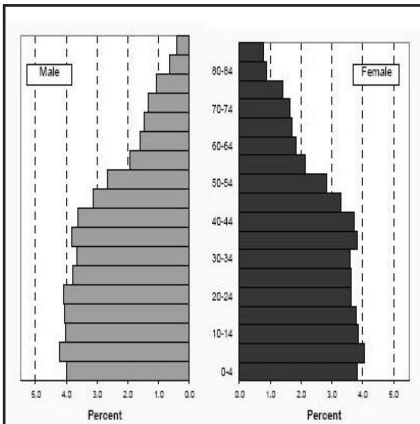

Figure 3: **Population pyramid, U.S.-Mexico border, 2000**

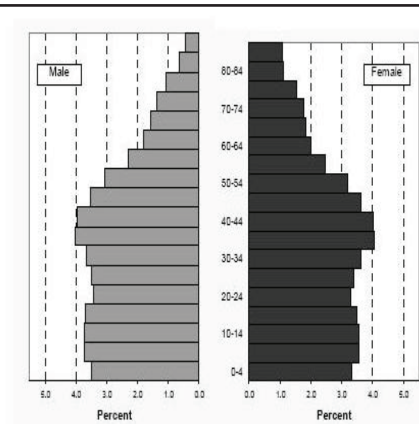

Figure 4: **Population pyramid, United States, 2000**

Source: U.S. Census Bureau, Summary File 1, 2000

Race and Ethnicity

Race and ethnicity are also important contributors to overall health. The high proportion of Hispanics in the border region means that a substantial part of the population may be predisposed to certain diseases, such as diabetes mellitus. Many border Hispanics experience a lack of health insurance coverage, low levels of income and education, and poor English language skills, all of which represent barriers to adequate health care. Access to health care on the border will be covered in Chapter 3, “Access To and Use of Health Care.” Data on border income, education and language skills are presented later in this chapter. In addition, a notable proportion of border Hispanics are migrant or seasonal farm workers, a situation that presents its own unique challenges to ensuring continuity of care (Benavides-Vaello, 1998).

Procedures for determining the racial identity of the U.S. population underwent major change in the 2000 census, as mentioned in the Methods section above. In previous censuses respondents were asked to select the single racial category that best described them. Using the new racial identity standards, respondents in the 2000 census were permitted to select more than one race, from a total of 31 racial categories, to reflect their racial heritage more accurately. More than 97 percent of the U.S. population selected a single racial category, but the remaining population selected two, three, or more races from the 31 possible categories. Presenting this information concisely is a major challenge. To simplify the presentation of such data for the U.S. border region, single-race estimates of the 2000 population, known as bridged-race estimates, were used in Table 2 and Figures 5-7. The bridged-race estimates of the 2000 population provide single-race estimates of the population using the four racial categories defined for use in the United States prior to 1997 (Ingram, 2003). These same bridged-race population estimates were used to calculate vital rates.

Table 2 provides details on the racial and ethnic mix of the border area in the year 2000 using the bridged-race population estimates. The racial and ethnic distribution of residents in the border states, and in particular the 44 border counties, differs substantially from the national pattern. At the national level, blacks and Hispanics share roughly equal proportions of the population, about 13 percent. At the border state and border county levels, however, the proportion of Hispanics is much larger and the proportion of blacks is smaller. The border areas of California and Arizona have some black and Asian-American residents. In California, more than 15 percent of the border population is composed of black and Asian-American residents. However, if San Diego County is excluded, Hispanics and non-Hispanic whites represent more than 95 percent of the remaining border population.

	White					
	Total	Non-Hispanic	Black	American Indian	Asian	HIspanic*
United States	81.7	70.0	13.0	1.1	4.2	12.6
Border states	**81.8**	**51.1**	**8.5**	**1.8**	**8.0**	**32.1**
Arizona	88.7	64.5	3.6	5.4	2.3	25.5
California	78.9	48.1	7.4	1.4	12.3	32.5
New Mexico	86.1	45.6	2.3	10.2	1.4	42.3
Texas	84.3	52.9	11.9	0.7	3.1	32.2
Border counties	**89.1**	**41.6**	**4.2**	**1.5**	**5.3**	**49.0**
Border counties*	***94.5***	***30.3***	***2.4***	***1.7***	***1.4***	***65.6***
Arizona border	**91.0**	**58.2**	**3.5**	**3.2**	**2.3**	**34.4**
Cochise	90.9	61.1	5.3	1.6	2.2	30.9
Pima	90.1	62.1	3.6	3.7	2.5	29.6
Santa Cruz	98.0	18.0	0.4	0.8	0.8	81.0
Yuma	94.0	44.9	2.6	2.0	1.4	50.8
California border	**82.3**	**54.9**	**6.5**	**1.2**	**10.0**	**29.1**
Imperial	90.8	20.8	4.3	2.3	2.6	72.6
San Diego	81.8	56.6	6.6	1.2	10.4	26.9
New Mexico border	**94.0**	**41.9**	**2.3**	**2.7**	**1.1**	**53.7**
Dona Ana	94.8	33.2	2.0	2.0	1.2	63.5
Otero	87.6	57.0	4.6	6.3	1.5	32.3
Other NM border	97.2	49.8	0.9	1.5	0.4	48.6
Texas border	**96.7**	**14.0**	**1.6**	**0.8**	**0.9**	**83.9**
Cameron	98.1	14.6	0.6	0.6	0.6	84.6
El Paso	94.1	17.3	3.4	1.1	1.4	78.5
Hidalgo	98.1	10.5	0.6	0.6	0.7	88.5
Maverick	97.4	3.6	0.4	1.4	0.8	95.2
Starr	99.0	2.1	0.2	0.3	0.5	97.6
Val Verde	96.7	22.0	1.8	0.8	0.7	75.8
Webb	98.3	5.0	0.5	0.7	0.6	94.4
Other TX border	97.1	24.6	1.7	0.7	0.5	73.5

***Table 2*: Percent distribution of population by race and ethnicity, U.S.-Mexico border 2000**

*Persons of Hispanic origin may be of any race.
**Excludes San Diego County
Source: NCHS website of U.S. census population with bridged-race categories, www.cdc.gov/nchs/about/major/dvs/popbridge/popbridge/htm

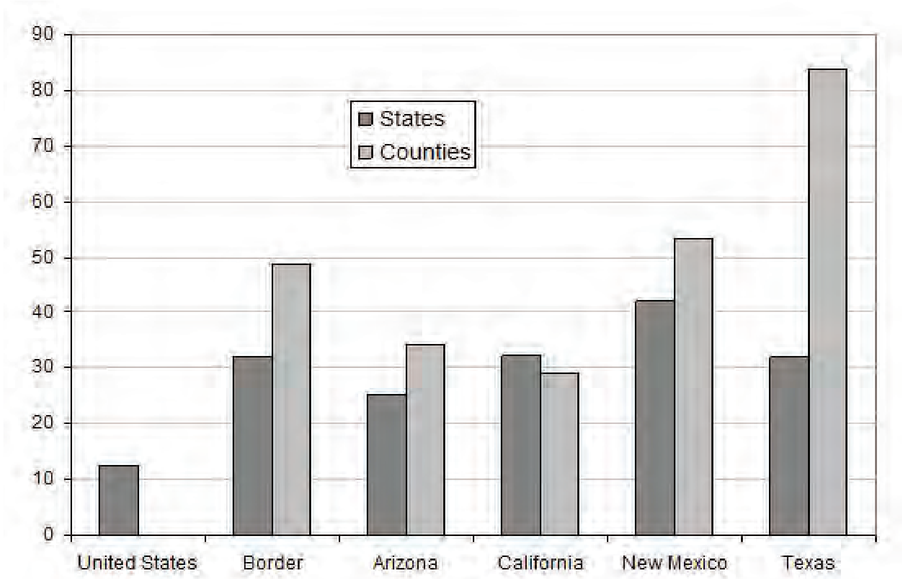

***Figure 5*: Percent Hispanic, U.S.-Mexico border region, 2000**

Source: NCHS website for U.S. Census population with bridged-race categories, www.cdc.gov/nchs/about/major/dvs/popbrige/popbridge/htm

Figure 5 provides race and ethnicity information for the two most prevalent groups in the U.S. border region: Hispanics and non-Hispanic whites. While Hispanics constituted slightly more than 12 percent of the total U.S. population, they represented nearly one-third of the combined population of the four border states. Within the 44 border counties, Hispanics were nearly half the total population. The percent Hispanic followed a west-east gradient, ranging from 29 percent in the California border counties, 34 percent in the Arizona border region, 54 percent in the New Mexico border area, to nearly 84 percent on the Texas border.

There were major differences in the age structure of the Hispanic and non-Hispanic white groups in the border region, as depicted in **Figure 6** and **Figure 7**. The population pyramid for the Hispanic border population displays the shape of a rapidly growing population, with large proportions in the youngest ages and a correspondingly small elderly population. The slightly smaller percentage in the 0-4 age group may be the first sign of a decline in birth rate in border Hispanics. The non-Hispanic white pyramid is quite different, with a large proportion of the total in the 35-54 year age range (corresponding to the years of the post-World War II baby boom), and smaller proportions in the very young and elderly age groups. Overall, 40 percent of the Hispanic population was under 20 years of age compared to 22 percent of non-Hispanic whites; less than 7 percent of the Hispanic population was aged 65 years or more, compared to nearly 18 percent of non-Hispanic whites.

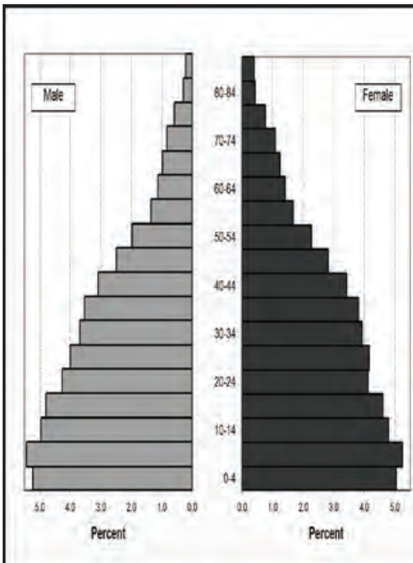

***Figure 6*: Population pyramid, U.S.-Mexico border. Hispanics, 2000**

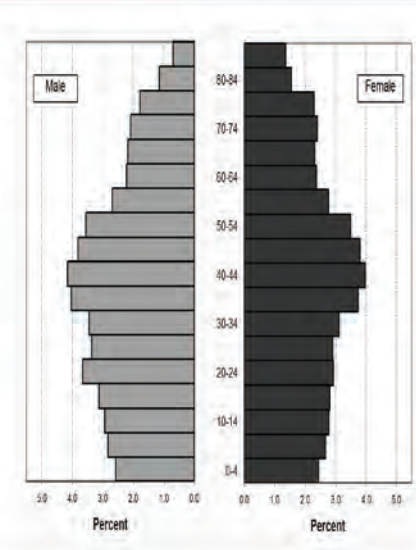

***Figure 7*: Population pyramid, U.S.-Mexico border. Non-Hispanic whites, 2000**

Source: NCHS website for U.S. Census population with bridged-race categories, www.cdc.gov/nchs/about/major/dvs/popbridge/popbridge/htm.

Foreign-Born Population

On the basis of figures from the 2000 census, more than 1.4 million border residents, amounting to nearly 22 percent of the border population, were born outside the United States to parents who were not U.S. citizens (**Table 3**). The proportion of foreign-born residents in the border region was almost exactly twice the proportion of foreign-born residents in the total U.S. population. This finding was not surprising given the migration flow into the United States from Latin America. The proportion of foreign-born residents was only slightly lower for the four border states combined, about 20 percent. Over the past decade, the impact of foreign immigration has been felt at all levels in the United States, with substantial increases in the proportion of foreign-born residents for the nation as a whole, the four border states, and the border counties. Mexico is the source of a growing number of immigrants to the United States, accounting for 30 percent of all foreign-born residents for the United States and 72 percent of the foreign-born residents in the border region. The constant influx of foreign-born border residents, combined with the high level of daily border crossings, increases the probability of communicable disease transmission in the border region.

	Foreign born population		Country of birth (percent distribution)		
	Number	Percent	Mexico	Other Latin America	Other
United States	31,107,889	11.1	29.5	22.2	48.3
Border states	12,569,686	20.4	50.5	10.6	38.9
Arizona	656,183	12.8	66.4	5.0	28.5
California	8,864,255	26.2	44.3	11.3	44.4
New Mexico	149,606	8.2	71.7	5.1	23.2
Texas	2,899,642	13.9	64.8	10.1	25.1
Border counties	1,435,155	21.9	71.9	3.3	24.8
Arizona border	167,424	14.4	72.1	3.8	24.0
California border	652,037	22.1	51.5	4.5	44.0
New Mexico border	47,010	15.1	85.9	1.8	12.3
Texas border	568,684	26.8	94.1	1.8	4.1

***Table 3*: Foreign-born population and county of birth, U.S.-Mexico border, 2000**

Source: U.S. Census Bureau, 2000 Census, Summary File 3

Language Ability

From a public health perspective, the ability to speak English is important in terms of understanding public health messages and communicating effectively with health personnel. Border state health departments have made great advances in providing translations into various languages of public health advertisements, brochures, and other materials, but an inability to speak English inevitably limits the ability of border residents to obtain health information.

According to the 2000 census, about four percent of the border population aged five years or more did not speak English at all, and an additional seven percent did not speak English well (**Table 4**). The proportion of non-English speakers was about two percent for the border areas of Arizona and California, four percent for the New Mexico border, and nine percent for the Texas border. For the entire border region, the percent that did not speak English at all rose from one percent for those aged 5-17 years to eight percent for those 65 years of age or more. Elderly Texas border residents represented the highest proportion of non-English speakers (18 percent). Health departments on the border must ensure that personnel are able to communicate with non-English speakers and that informational materials are translated into the appropriate languages.

	Age 5+		Age 5-17		Age 18-64		Age 65+	
	Not at all	Not well	Not at all	Not well	Not at all	Not well	Not at all	Not well
United States	1.3	2.9	0.4	2.5	1.5	3.3	1.6	2.4
Border states	3.1	5.9	1.0	6.8	3.7	6.6	4.0	5.0
Border counties	4.4	6.7	1.2	12.9	4.9	7.0	7.7	7.0
Border counties*	6.2	7.9	1.5	20.0	7.0	8.1	11.1	8.5
Arizona border	2.2	4.1	0.9	5.5	2.6	4.5	2.4	2.9
California border	2.4	5.5	0.9	7.3	2.6	5.9	3.6	5.1
New Mexico border	3.6	5.4	1.3	9.7	4.1	5.6	5.3	4.9
Texas border	8.6	10.2	1.7	41.2	9.8	10.4	18.4	13.3

***Table 4*: Percent distribution of population age 5+ by ability to speak English, U.S.-Mexico border, 2000**

*Excludes San Diego County
Source: U.S. Census Bureau, 2000 Census, Summary File 3

Socioeconomic Status

The population of the U.S. border region is typically characterized as being of low socioeconomic status in terms of income, poverty status, level of education, and other measures. Socioeconomic status can be an important factor in determining diet, environmental exposures, and other health risk factors. While average socioeconomic measures for the border are substantially below the national averages, the border counties are not uniformly disadvantaged. Indeed, certain border communities are substantially better off than the national average in terms of income, poverty level, unemployment, or education. Two such border counties are San Diego County, California and Pima County, Arizona. Of the two, San Diego is the most important because it represents 43 percent of the total border population and so has a disproportionate effect on border-wide averages. To illustrate this effect, we have calculated border-wide averages for socioeconomic measures in two different ways: including San Diego and excluding San Diego. The average figures that exclude San Diego County provide a more accurate picture of socioeconomic levels for most areas of the border.

Low income limits access to health care, in particular for those border families whose income is above Medicaid income limits but who still cannot afford health insurance and are unable to pay out of pocket for health-care costs. Hospitals, clinics, and physicians are also less likely to locate in poor areas.

Table 5 presents per capita income information for 1999 by race/ethnicity, as well as percent growth since 1989. Information on non-Hispanic whites was not available from the 1990 census, so trend data were only analyzed for the total and Hispanic populations. Starting with 1999 data for the total population, per capita income in 1999 for the entire border region was $17,771 or about 82 percent of the national level ($21,587). If San Diego County is excluded, however, the per capita income level for the border drops to $13,892, less than two-thirds the national figure. In the border counties of three of the four states, per capita income is lower than the national level: Arizona (86 percent of the national average), New Mexico (64 percent), and Texas (53 percent). Per capita income in the California counties, on the other hand, was higher than the U.S. level, at $22,460. Only three border counties had per capita incomes above $15,000: San Diego County ($22,926), Pima County ($19,785) and Cochise County ($15,988). Starr County, Texas reported the lowest per capita income of any border county, $7,069 or less than one-third the national level. Within the border region, per capita income was lowest in Texas, highest in California, and in general rose from east to west.

Comparing per capita income figures by race/ethnicity showed striking differences in the border region between income levels of non-Hispanic whites and Hispanics (Table 5; **Figure 8**). For non-Hispanic whites in the border region, per capita income was more than twice Hispanic income ($27,411 versus $9,928) and was actually higher than U.S. national per capita income.

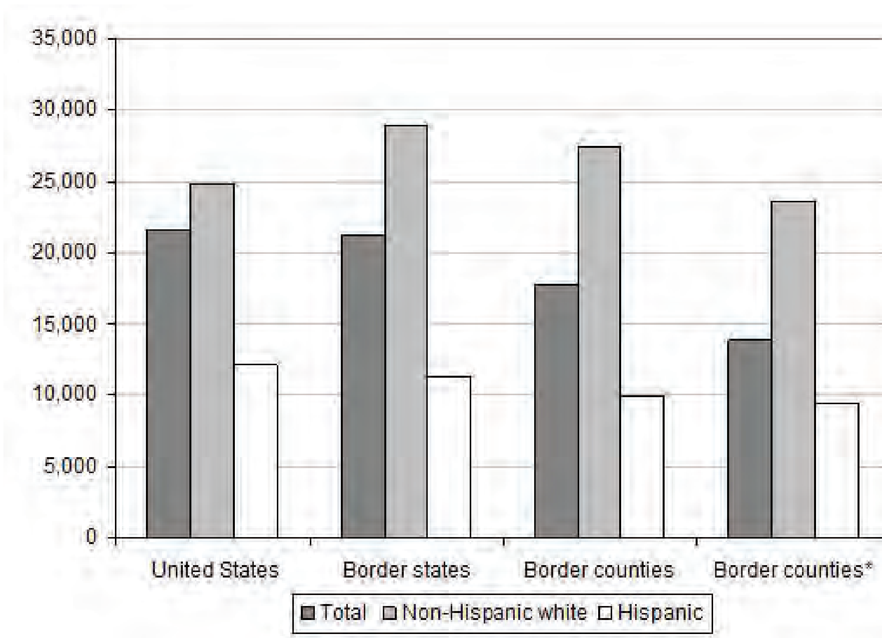

***Figure 8*: Per capita income by race/ethnicity, U.S.-Mexico border, 1999**

*Excludes San Diego County

	1999			Percent change, 1989-99*	
	Total	Non-Hispanic white	Hispanic	Total	Hispanic
United States	21,587	24,819	12,111	11.4	7.3
Border states	**21,302**	**28,888**	**11,314**	**6.4**	**8.1**
Arizona	20,275	25,239	10,629	12.1	7.3
California	22,711	31,700	11,674	3.0	2.2
New Mexico	17,261	23,976	12,045	14.2	18.9
Texas	19,617	26,197	10,770	13.2	20.9
Border counties	**17,771**	**27,411**	**9,928**	**5.8**	**14.0**
*Border counties***	*13,892*	*23,575*	*9,372*	*10.8*	*18.3*
Arizona border	**18,497**	**23,929**	**10,528**	**10.6**	**11.3**
Cochise	15,988	19,424	9,530	11.1	20.0
Pima	19,785	24,775	11,318	11.8	10.3
Santa Cruz	13,278	30,289	9,460	9.7	9.1
Yuma	14,802	21,649	8,964	5.7	14.2
California border	**22,460**	**30,029**	**11,520**	**5.0**	**4.6**
Imperial	13,239	23,497	9,927	7.0	18.0
San Diego	22,926	30,150	11,738	5.2	3.1
New Mexico bdr	**13,918**	**19,975**	**9,350**	**9.4**	**14.0**
Doña Ana	13,999	22,892	9,328	11.2	14.6
Otero	14,345	18,243	9,029	6.2	7.2
- Other NM bdr	13,378	17,089	9,592	8.3	15.8
Texas border	**11,419**	**24,359**	**9,085**	**11.1**	**22.6**
Cameron	10,960	24,153	8,546	14.5	22.4
El Paso	13,421	26,926	10,273	9.2	22.3
Hidalgo	9,899	24,575	8,012	11.1	19.1
Maverick	8,758	18,135	8,457	25.7	41.7
Starr	7,069	14,995	6,912	26.7	27.6
Val Verde	12,096	20,795	9,402	13.9	29.5
Webb	10,759	24,694	9,966	18.3	21.1
- Other TX bdr	11,983	19,269	9,294	18.4	33.3

***Table 5*: Per capita income by race/ethnicity and percent change, U.S.-Mexico border region, 1989 and 1999**

*1989-99 change is measured in constant 1999 dollars.
**Excludes San Diego County
Source: U.S. Census Bureau, 1990 and 2000 Census, Summary File 3

Even with San Diego excluded, non-Hispanic white income in the border region was only slightly lower than the national figure. The largest difference in per capita income between the two race/ethnicity groups was in California, where non-Hispanic whites' income was nearly three times Hispanics' income ($30,029 versus $11,520).

Between 1989 and 1999, the per capita income growth rate in the border region was only half the national growth rate (6 percent versus 11 percent), as shown in the two right-hand columns of Table 5. Income growth was highest in the Arizona and Texas border regions (11 percent in both), and lowest in the California border region (5 percent). Although Hispanic per capita income remained far lower than that for non-Hispanic whites in 2000, per capita income for Hispanics increased substantially during the 1990s. From 1989 to 1999, per capita income for Hispanic border residents grew by 14 percent, or nearly triple the 5.8 percent growth for the total border population. Income growth for Hispanics was highest in the border areas of Texas (23 percent) and Arizona (11 percent). The smallest increase in Hispanic income during the decade was in San Diego County (3 percent).

Poverty Status

Poverty status measures illustrate the high level of poverty within the border region (**Table 6**). In 1999, the proportion of the border population below the poverty level was more than 50 percent higher than for the U.S. as a whole, 20 percent versus 12 percent. However, when San Diego County data were removed from the calculation, the percent of the border population living below the poverty level increased to 25 percent, more than double the national rate. Of the border counties, the lowest percentage of poor was in San Diego (12 percent) and the highest was in Starr County, Texas (51 percent). Information on the percent of children living in poverty showed similar results for the border region: 27 percent lived below the poverty level on the border, compared to 16 percent nationwide. Hispanics in the border region were more than three times as likely as non-Hispanic whites to be living in poverty, 30 percent versus 8 percent. The percentage of children living in poverty was four times higher for Hispanics than for non-Hispanic whites, 37 percent versus 9 percent.

There was only a small decrease in the border poverty rate during the 1990s, but among Hispanics the decline was much larger. From 1989 to 1999, the proportion of the border population living below the poverty level declined by one percentage point (from 21 percent to 20 percent), while for Hispanics the rate dropped 6 percentage points (from 36 percent to 30 percent). The poverty rate for the total population increased or remained unchanged during the decade in San Diego and several other border counties. Among

	Percent below poverty					Percent of children below poverty				
	1989		1999			1989		1999		
	Total	Hispanic	Total	NHW*	Hispanic	Total	Hispanic	Total	NHW*	Hispanic
United States	13.1	25.3	12.4	8.1	22.6	18.3	32.2	16.1	9.0	27.4
Border states	**14.8**	**26.0**	**14.7**	**7.9**	**23.5**	**20.9**	**32.4**	**19.6**	**8.3**	**28.4**
Arizona	15.7	28.3	13.9	7.8	24.5	22.0	34.9	18.8	8.4	28.8
California	12.5	21.6	14.2	7.8	22.1	18.2	27.2	19.0	8.4	26.8
New Mexico	20.6	27.8	18.4	9.9	23.7	27.8	35.0	24.6	12.0	29.2
Texas	18.1	33.0	15.4	7.8	25.4	24.3	40.2	20.2	7.9	30.9
Border counties	**21.0**	**35.9**	**19.8**	**8.4**	**30.0**	**30.1**	**43.8**	**27.4**	**9.1**	**36.8**
Border counties**	29.0	39.6	25.2	10.0	32.4	39.1	47.9	34.1	12.3	39.8
Arizona border	**18.2**	**30.4**	**15.9**	**9.5**	**25.3**	**25.1**	**37.7**	**21.9**	**10.5**	**30.9**
Cochise	20.3	37.0	17.7	11.6	30.7	28.2	44.4	25.8	16.5	38.1
Pima	17.2	28.2	14.7	9.4	22.9	23.5	35.5	19.4	9.6	28.5
Santa Cruz	26.4	31.6	24.5	8.7	28.0	34.5	39.2	29.7	8.2	31.6
Yuma	19.9	33.4	19.2	8.1	28.9	28.3	40.3	27.9	10.9	34.3
California border	**11.9**	**23.6**	**12.9**	**7.2**	**22.5**	**17.1**	**29.3**	**17.2**	**7.1**	**27.4**
Imperial	23.8	29.4	22.6	11.1	25.9	31.1	35.7	28.7	13.0	31.3
San Diego	11.3	22.8	12.4	7.2	22.0	16.2	28.2	16.5	7.0	26.8
NM border	**23.8**	**34.5**	**24.0**	**12.9**	**32.2**	**32.0**	**42.5**	**33.4**	**16.8**	**40.2**
Dona Ana	26.5	35.5	25.4	12.5	31.9	34.8	43.6	34.4	14.8	39.6
Otero	16.7	30.0	19.3	10.5	32.0	22.8	36.7	27.9	14.6	40.2
Other NM border	24.0	33.8	24.5	15.8	33.1	33.9	42.1	35.6	22.4	42.1
Texas border	**35.8**	**42.4**	**30.6**	**9.7**	**34.4**	**46.1**	**51.0**	**39.6**	**14.0**	**42.3**
Cameron	39.7	45.9	33.1	9.7	37.2	50.7	54.5	43.1	14.3	45.6
El Paso	26.8	34.0	23.8	7.9	27.7	36.1	42.5	31.5	10.4	35.0
Hidalgo	41.9	47.1	35.9	9.4	39.2	52.7	55.6	45.5	16.3	47.2
Maverick	50.4	52.3	34.8	18.1	35.2	58.3	59.2	40.6	19.1	40.9
Starr	60.0	60.9	50.9	30.1	51.4	68.0	68.7	59.4	59.4	59.6
Val Verde	36.4	47.7	26.1	7.7	31.8	47.0	55.8	33.8	5.4	39.2
Webb	38.2	39.6	31.2	17.8	32.0	47.3	48.4	39.4	27.7	40.0
Other TX border	36.4	46.2	28.8	12.9	34.0	45.7	53.7	37.1	17.5	41.0

***Table 6*: Population by poverty status and ethnicity, U.S.-Mexico border 1989 and 1999**
*Non-Hispanic white, **Excluding San Diego County
Source: U.S. Census Bureau, 1990 and 2000 Census, Summary File 3

children, the poverty rate declined moderately during the decade, with a larger drop for Hispanic children. The childhood poverty rate fell 3 percentage points for all border children, from 30 percent to 27 percent, while for Hispanic children the rate declined 7 percentage points (44 percent to 37 percent). The greatest declines in poverty rates were in the Arizona and Texas border areas.

Unemployment Rates

Unemployment rates for the border are provided in **Table 7**. The level of unemployment as measured by the 2000 census was overstated, the result of problems with responses from individuals living in group quarters. In 2003, the Census Bureau produced more reliable unemployment rates by limiting this measure to respondents living in households (Column A in Table 7). The household-only unemployment data followed the same pattern as the income and poverty measures discussed above: The rates followed a west-east gradient, with the lowest rates in the border area of California and the highest rates in the border area of Texas. Pima County, Arizona had the lowest unemployment rate (5 percent) and Starr County, Texas had the highest rate (20.9 percent).

Information on race/ethnicity was not available for the household-only population, but unemployment rates for racial and ethnic groups were obtained for the total population (see columns B-D, Table 7). Even though these rates are overstated, they remain useful in illustrating differences in unemployment by race/ethnicity. The unemployment rate for border Hispanics was two or more times the rate for non-Hispanic whites at the national, border state, and border county levels. In the border counties, the race/ethnicity differential did not differ greatly across states. The lowest differential was in the California border region, where the unemployment rate for Hispanics was 1.9 times that for non-Hispanic whites, and the highest was in Texas, where the unemployment rate for Hispanics was 2.4 times higher than the rate for non-Hispanic whites.

Education

Education is another important indicator of health status (Marmot, 2005; Smith, 2005). Individuals with higher education levels are more likely to seek health care, adopt healthy behaviors, and know both about the availability of health care and how and when to access it appropriately. The level of education for adults (aged 25 years or more) in the border region was considerably lower than for the United States as a whole, as depicted in **Figure 9** and in **Table 8**. Nearly 15 percent of border adults had completed less than nine years of education in 2000, double the proportion for the United States (7.5 percent).

Area	Population in Households* (Col. A)	Total Population** All Races (Col. B)	non-Hispanic Whites* (Col. C)	Hispanic (Col. D)
United States	5.2	5.8	4.3	9.3
Border states	**6.2**	**6.6**	**4.6**	**9.5**
Arizona	5.4	5.6	4.1	8.1
California	6.6	7.0	5.0	10.2
New Mexico	7.0	7.3	4.6	8.8
Texas	5.7	6.1	4.1	8.7
Border counties	**7.3**	**7.7**	**4.7**	**10.8**
*Border counties****	*9.0*	*9.0*	*4.6*	*11.6*
Arizona border	**6.0**	**6.3**	**4.4**	**9.4**
Cochise	6.5	6.7	5.3	10.5
Pima	5.0	5.3	4.2	7.0
Santa Cruz	7.8	7.7	3.2	9.2
Yuma	11.9	12.1	6.0	17.5
California border	**5.7**	**6.2**	**4.7**	**9.0**
Imperial	12.5	12.6	6.1	14.8
San Diego	5.4	5.9	4.6	8.4
New Mexico border	**8.8**	**9.3**	**6.0**	**11.8**
Dona Ana	8.3	9.2	5.4	11.3
Otero	8.0	8.1	6.2	10.6
- Other NM border counties	10.6	10.7	7.2	14.2
Texas border	**10.7**	**10.9**	**5.0**	**12.0**
Cameron	11.3	11.4	5.0	12.6
El Paso	9.2	9.5	5.3	10.6
Hidalgo	12.0	12.0	5.1	12.8
Maverick	17.5	17.6	3.5	18.0
Starr	20.9	20.9	7.9	21.3
Val Verde	11.2	11.3	3.6	13.7
Webb	9.2	9.3	5.0	9.6
- Other TX border counties	9.1	9.4	4.4	11.3

***Table 7*: Unemployment rate by ethnicity, U.S.-Mexico border region, 2000**

*Excludes San Diego County
**Source: U.S. Census Bureau, 2000 Census, PHC-T28: Employment information for the population in households
***Source: U.S. Census Bureau, 2000 Census, Summary File 3

The percentage of border adults with less than nine years of education increased to 20 percent when San Diego County was excluded, nearly three times the national figure. Education data followed the same west-east pattern, with the lowest percent of adults with less than nine years of education in California (8.7 percent) and the highest in Texas (28.3 percent). In two Texas border counties, Maverick and Starr, the percent of adults with less than nine years of education exceeded 40 percent.

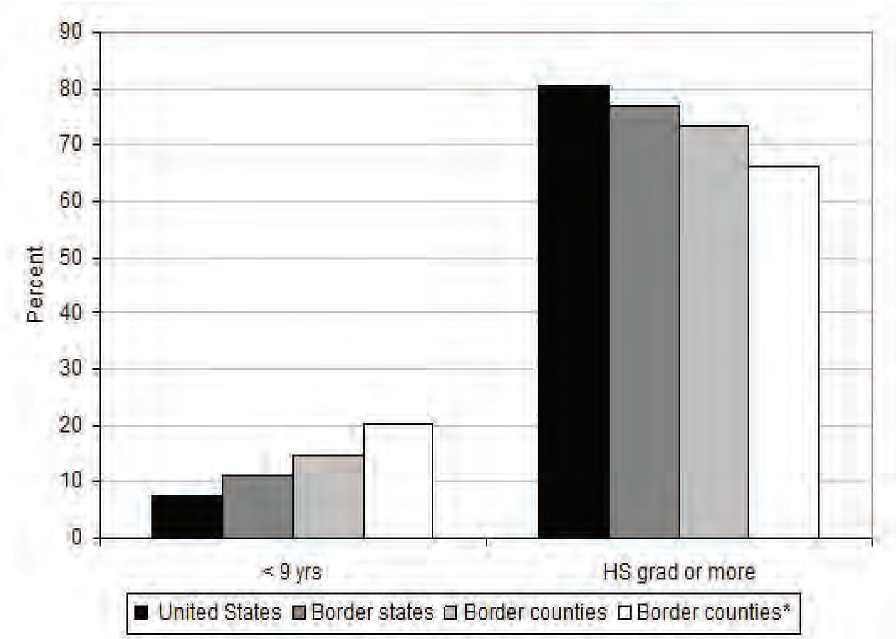

***Figure 9*: Education level, U.S.-Mexico Border, 2000**

*Excludes San Diego County

Source: U.S. Census Bureau, 2000 Census, Summary File 3

Across the United States as a whole, educational achievement was significantly higher for non-Hispanic whites than for Hispanics. The differential was even greater at the border, as **Figure 10** illustrates. Nationwide in 2000, 86 percent of non-Hispanic whites and 52 percent of Hispanics had completed a high school education or more. In the border region, the proportion of non-Hispanic whites completing high school or more was actually higher (91 percent) than for the United States, and the same was true for the border region without San Diego (89 percent). The percent of border Hispanics completing high school or better was similar to the U.S. Hispanic rate, about 50 percent.

Educational achievement improved from 1990 to 2000 for the United States as a whole and for the border region (**Table 8**). The proportion of the population with less than nine years of education fell in all areas during the 1990s, although

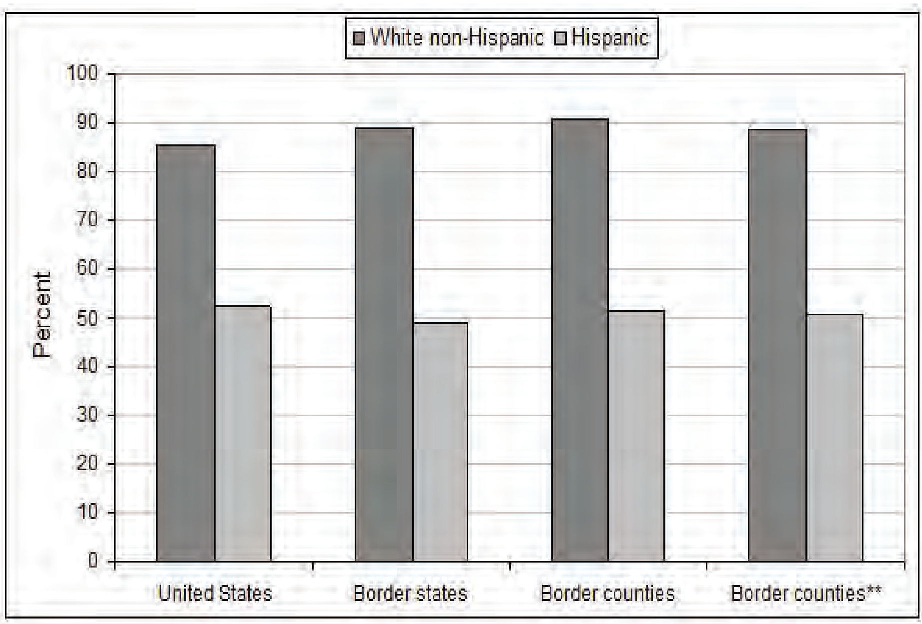

***Figure 10*: Percent high school graduate or more, U.S.-Mexico border, 2000**

*Excludes San Diego County
Source: U.S. Census Bureau, 2000 Census, Summary File 3

	< 9 years		9-12 years		High school		Some college		BA or more	
	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000
United States	10.4	7.5	14.4	12.1	30.0	28.6	24.9	27.4	20.3	24.4
Border states	11.7	11.1	13.2	12.1	23.8	22.2	29.1	29.4	22.1	25.1
Border counties	16.0	14.8	11.7	11.8	22.9	21.3	29.0	29.2	20.4	22.9
Border counties*	23.9	20.3	12.9	13.6	23.0	22.5	24.4	26.0	15.8	17.5
Arizona border	10.6	8.5	11.8	11.4	25.3	23.8	31.3	32.6	21.0	23.6
California border	8.4	8.7	10.8	9.8	22.7	19.9	33.5	32.9	24.7	28.7
New Mexico border	15.8	14.9	12.7	12.3	27.8	25.9	25.7	27.8	18.0	19.0
Texas border	33.1	28.3	13.3	15.0	21.0	21.3	20.0	21.5	12.7	14.0

Table 8: Percent distribution of population (age 25+) by education level, U.S.-Mexico border region, 1990 and 2000

*Excludes San Diego County
Source: U.S. Census Bureau, 2000, Summary File 3

this proportion remained far higher in the Texas border counties (28 percent) than elsewhere. For the United States, the decade saw an increase of four percentage points in the proportion with a four-year college degree or more, from 20.3 to 24.4 percent. The proportion with a four-year college degree or more also increased in the border region, although the increase was smaller than for the nation as a whole (2.5 percentage point rise); the smallest gains were in the border areas of New Mexico and Texas (1.0 and 1.3 percentage point gains, respectively).

Conclusion

A variety of forces have affected the size and composition of the border population over time, and will continue to do so into the future. A combination of climate, terrain, and water availability has led to a highly urbanized population on both sides of the border, producing a string of city pairs known as sister cities. The population has grown rapidly in recent decades, and if the same pace continues will double by 2030. High birth rates, especially in the Hispanic population, is producing rapid growth in the number of children. Job opportunities attract working-age migrants, and a combination of climate and low cost of living draws many retirees to the area. A large proportion of the population is foreign born. The Hispanic proportion of the population is high, and that proportion increases from west to east along the border.

The border region does not fare well in terms of socioeconomic measures. The unemployment and poverty rates are substantially above the national average and per capita income is significantly below the national figure; these differences are much greater when San Diego is removed from the border averages. Educational achievement is also lower among the border population. These socioeconomic disadvantages are particularly marked among Hispanic border residents. Combined, these demographics present a number of challenges to improving health at the border. The rapidly growing border population presents a challenge to ensure an adequate future supply of health resources, including health personnel, equipment, and supplies. The sparse population of many U.S. border counties may limit access to care, as residents may live many miles from health facilities and specialized care. Low income levels also limit access to care, in part because individuals lack health insurance and are unable to pay out of pocket, but also because hospitals, clinics, and physicians are less likely to locate in poor areas. This is reflected by the fact that several U.S. border counties do not have a single hospital, clinic, or physician.

Socioeconomic status also can be an important factor in determining diet, environmental exposures, and other risk factors. The education level of the U.S. border population is relatively low, particularly in Texas and New Mexico, and this can play an important role in individuals' willingness to seek health care, in the adoption of healthy behaviors, and in the knowledge of the availability of health care The aging of the population in the U.S. border region is likely to lead to a growing prevalence of chronic diseases, while the high proportion of Hispanics in the border region means that an important part of the population may be predisposed to certain diseases, such as diabetes mellitus. The high proportion of foreign-born residents and the large number of daily border crossings increase the probability of communicable disease transmission. A significant proportion of border residents speak no English, and a larger proportion does not speak English well. This limits their ability to obtain health information and to interact with health personnel. Border health department personnel must have foreign language skills to establish verbal and written communication with residents.

A growing and diverse border population presents a number of challenges to public and private health-care services in the border region. The following chapters examine these issues from the perspectives of access to care, health workforce development and retention, and mortality rates for leading diseases.

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CHAPTER 2

THE HEALTHCARE WORKFORCE

The health workforce is a key contributor to the quality of life of the border population and a critical element in reaching Healthy Border 2010 goals. Regrettably, primary care, dental, and mental health professional shortage areas – as defined by the Health Resources and Services Administration (HRSA) – are 25 percent to 49 percent more prevalent in the border region than in the rest of the nation. Community clinics located in border areas struggle to serve a growing population of patients who are poor, inadequately insured, or not insured.

There are many challenges to attracting, educating, and retaining a health-care workforce capable of serving the diverse needs of the border population. These challenges include uneven demographic distribution, rapid population expansion, poor distribution of the health workforce, low health insurance rates, and socioeconomic barriers to access to care. This chapter briefly reviews these challenges. Then it partially illustrates them with descriptive data from a recent, unprecedented, yet still limited study of the border health workforce. It concludes with observations addressing urgent border health workforce policy issues.

Uneven demographic distribution affects the size and quality of sub-regional and small areas' demand for health services. Therefore, delivering adequate care to the border communities will require customized strategies. As discussed in Chapter 1, "The U.S. Population at the Border," the population of the 44 border counties is growing in a geographically unequal pattern at an overall rate of about two percent per year. For example, almost half of the population of the U.S.-Mexico border region resides in two California counties that make up only seven percent of the region's land area. In contrast, 32 Texas counties, stretching over 64 percent of that frontier, are home to only one-third of total border residents.

Besides uneven distribution, other demographic factors pose unique challenges to health workforce development and retention. The most recent population projections by the U.S. Bureau of the Census (2004) have revived professional and public attention to the aging population. A parallel phenomenon, the aging health workforce, threatens its size and effectiveness. This is particularly true in the border region, where socioeconomic pressures often induce younger physicians to relocate to non-border areas.

The growth of minority groups is another major demographic change taking place throughout the U.S., and in greater relative magnitude in the border regions. Between 2000 and 2050, the minority population is expected to account for approximately 89 percent of total population growth, with Hispanics contributing nearly half of that increase (48.6 percent; Murdock, 2005). The large Hispanic population of the U.S.-Mexico border region will lead to structural changes in the country's demographic profile and, more than ever before, will require a culturally competent health workforce to adequately address its health-care needs.

Increasing diversity of the population does not in itself call for diversity in the health professions. However, researchers including Cohen, Gabriel, and Terrell (2002) have argued that "absent sufficient health and racial diversity, the health-care workforce would be unable to fulfill its fundamental obligation to the public" (p. 91). Their argument is rooted in four observations.First, cultural competence – a combination of knowledge, skills, attitudes, and behavior – is a necessary tool for effective patient/doctor interaction with persons of different cultural background. Second, it has been well documented that minority health professionals are more likely to locate in underserved communities than their non-Hispanic white counterparts. Third, because many serious health problems disproportionately affect minorities, the research agenda must place a greater focus on minority health and more minority researchers must be recruited and encouraged. Finally, diversity is needed in the managerial and policy health sectors to find appropriate solutions for the pressing health problems of the future. These researchers concluded that diversity in the education of health professionals is the necessary condition to augment the pool of competent and influential decision makers in all of the above areas of professional activity (Cohen et al., 2002).

Large-scale ethnic diversification will significantly impact the mix of diseases in the U.S. population. In turn, changes in the type of health services and required health professional competencies will be needed to address shifting disease burdens in those regions with a high concentration of minorities. Ethnic diversification will also magnify the impact of socioeconomic disparities between ethnic groups. Poverty rates of Hispanics and blacks are two to three times those of non-Hispanic whites. This will increase the need for decentralized delivery systems capable of reaching out to isolated and underserved communities (Murdock, 2005).

In summary, different health strategies – ideally with decentralized and community-based delivery systems using a workforce of health professionals with special competencies – are needed to address the different factors that account for diseases and health disorders among the communities stretched over a 2,000-mile border characterized by varied geographic, demographic, and socioeconomic environments.

Often, the need for different strategies is not immediately apparent. Health conditions may be epidemiologically equivalent among different border communities but vary in causes, morbidity, and contributing environmental and socioeconomic factors. For example, in some communities the major barrier to access may be the driving distance to the closest clinic; in others, language and the absence of culturally competent providers may cause a nearby facility to be inaccessible to those who need it most. In other cases, a lack of specialists for prevailing morbidities may affect the health status of border neighborhoods. In yet other communities, urban enclaves of uninsured and underinsured workers remain isolated even when located near well-equipped health-care facilities.

This need for different strategies and types of providers makes their quantity and availability an even greater challenge for educational and service delivery institutions. Yet increasing the number and the types of health workers will not in itself improve the health status of border residents. Appropriate and growing economic activity is needed to attract and retain the health workforce which is, in turn, both a direct and an indirect contributor to economic development. Directly, the health workforce payroll and infrastructure trigger economic multipliers; indirectly, an adequate and skilled health workforce contributes to a healthier population and thus sustains socioeconomic progress. Without adequate economic infrastructure, adverse distribution of the health workforce is inevitable, and short tenure of providers where they are needed most will reduce or even neutralize the impact of programs aimed at increasing the health workforce.

Methods

This chapter uses data from the HRSA Border County Health Workforce Profiles (2007) to provide an overview of available information about the health workforce in the border region. The Evaluation and Analysis Branch of the Bureau of Health Professions, HRSA, developed *Border County Health Workforce Profiles* under a contract with the Regional Center for Health Workforce Studies (RCHWS) of The University of Texas Health Science Center at San Antonio[1].

1 The study is available in its entirety by individual state reports at the HRSA web site (http://bhpr.hrsa.gov/healthworkforce/) and at the RCHWS/UTHSCSA web site (http://www.uthscsa.edu/rchws/projects.htm).

This data-gathering project was the first systematic effort to assemble current information on the health workforce in the border region, relevant population characteristics, and basic health indicators in one consistent database. The study was designed to address the emerging health-care needs of the diverse and rapidly changing population of the U.S.-Mexico border region and the challenge of developing policy responses with the limited, usually highly aggregated, and non-comparable information on the health workforce available from state databases.

County-level data were obtained from state health agencies and health professions' licensing boards and verified for comparability and consistency. These data were used to develop social and health indicators and estimate practitioner-to-population ratios. Healthy Border 2010 objectives guided the selection of health indicators. Border county values were then compared to values for each state – Arizona, California, New Mexico, Texas – as a whole, the total for the four border states, and the nation. These indicators help describe health status and health disparities in the U.S.-Mexico border region, as well as provide information on the number of practitioners available to address the health needs of the areas. Because Florida bears some similarity to the states that share a border with Mexico, being a port of entry and a place of settlement for immigrants entering the United States, it was added to the series as an additional independent study.

The health professions included in the study were physicians, dentists, registered nurses, physician assistants, and selected specialties of these professions. Vital statistics, hospital discharge data, and incidence data for selected diseases were gathered from state health departments. Prevalence data for select health conditions were retrieved from the Behavioral Risk Factor Surveillance System. County population estimates from the U.S. Census Bureau were used to calculate the rates reported here. Ratios of providers per 100,000 population were calculated as a first approximation of the health care available to the population living in the health workforce service area.

While the information in the profiles is a great improvement over existing and rarely comparable data, many limitations remain. Data on state sub-regions are only available at the county level for all the states. Thus, politically defined county boundaries were used as a unit of measurement, rather than the service areas within which health care is actually delivered. County averages may hide important differences among sub-regions. For example, concentrations of health professionals in an urban area may overshadow the lack of health services in rural communities and produce inaccurate, better-than-average provider-to-population ratios for the county as a whole.

Distribution of Health Professionals

The ratio of health providers per 100,000 population is commonly used as a rough indicator of the supply of health professionals relative to the demand for their services. In the border region, these ratios ranged from less than half of the national average (physicians in Texas) to values that were at par with it (physicians in California) or exceeded it (registered nurses in Arizona). Ratios for key members of medical teams are shown in **Table 1**.

	Physicians	Registered Nurses	Physician Assistants	Nurse Practitioners
United States	278.0	782.0	14.8	27.6
Border States	219.1	692.1	12.9	38.4
Total Border Area	207.6	661.3	11.4	40.8
Arizona	239.0	851.3	12.3	37.4
California	275.6	796.2	14.0	66.7
New Mexico	138.5	611.9	10.4	24.2
Texas	107.8	380.4	7.4	9.7

***Table 1*: Health professionals per 100,000 population**

Sources: (1) Arizona: Arizona Medical Board (2004), and Arizona Board of Osteopathic Examiners in Medicine and Surgery (2004), and Arizona State Board of Nursing (2004); (2) California: California Department of Consumer Affairs (2004); (3) New Mexico: New Mexico Health Policy Commission (2003); (4) Texas: Texas State Board of Medical Examiners (2003) and Texas Board of Nurse Examiners (2003); and (5) U.S.: Bureau of Health Professions, Health Resources and Services Administration, U.S. Department of Health and Human Services (2000).

Generally, ratios of health professionals to population in border states and the border region were well below those for the nation. However, ratios of nurse practitioners were close to or above the national average of 27.6. Since U.S. data were retrieved from the 2000 Census and state data were from 2003 and 2004 databases, the differences between the border and the nation may be assumed to be greater than those shown in the table. The averaged values also do not reflect the hardship of underserved communities in inner cities and rural areas of the border, since health-care professionals are more likely to practice in more affluent urban and suburban centers. Also, adverse geographic distribution remains hidden in averages and aggregate statistics.

Maldistribution of physicians occurs throughout the border region. Statewide, only 12 percent of counties in California and three percent of counties in Arizona have concentrations of physicians comparable to or greater than the national average. The lowest ratios were found in rural counties. **Figures 1 and 2** show physician distribution for the states of California and Arizona and illustrate how the aggregate totals can mask differences within a region. In California, the number of physicians available in the border counties per 100,000 population was similar to the number of physicians in the United States: 276 and 278, respectively. However, closer examination of the two counties in the California border region reveals that San Diego County has a disproportionately larger number of physicians than neighboring Imperial County. A similar situation exists in Arizona where Pima County, which includes Tucson, has more physicians per 100,000 population than other border counties in the state.

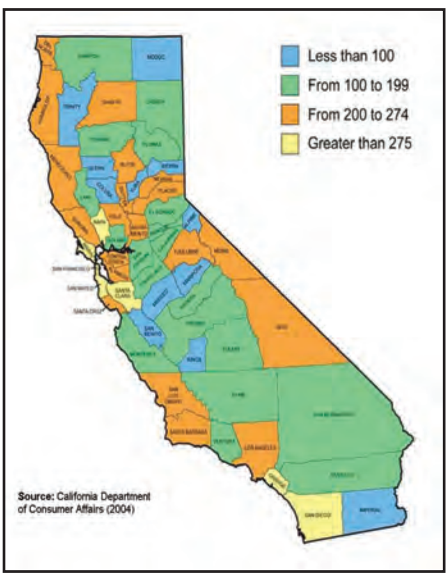


***Figure 1*: Physicians per 100,000 population in California**

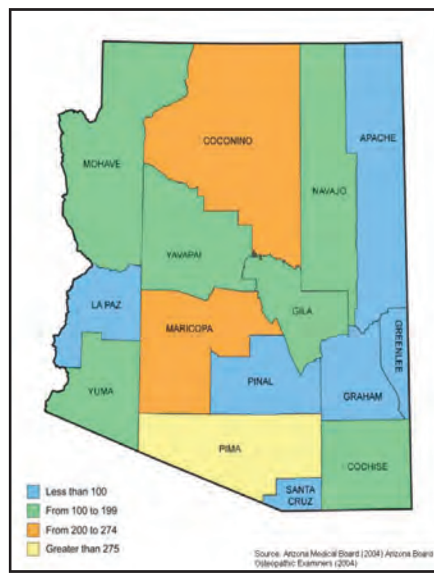


***Figure 2*: Physicians per 100,000 population in Arizona**

Changes in the Health Workforce

Historical data for comparing health professional characteristics over time were available only for Texas. This data is summarized in **Tables 2, 3 and 4**. The Regional Center for Health Workforce Studies at the University of Texas Health Science Center at San Antonio and the Texas Department of State Health Services are the only repositories of health workforce data dating back to the 1980s, at least for some professions. Most state agencies maintain only current licensure data, and no other research centers have systematically acquired licensure data every year, on the same month, to create a reliable source of historical information. The lack of historical data from other border states and the diversity of population, socioeconomic characteristics, and public health structures among them suggest caution in generalizing the Texas experience to the region as a whole. At the time of writing, adequate information could not be found to support a comparative analysis.

2000 (Total = 29,286)

Gender		Age (in 2000)		Race/Ethnicity	
Female	19.6%	Under 35	7.7%	Non-Hispanic White	72.0%
Male	80.4%	35-44	30.3%	Black	3.2%
		45-54	32.8%	Hispanic	10.2%
		55-64	18.2%	Asian/Pacific Islander	12.3%
		65+	11.0%	Amer. Indian/Alaska Native	0.2%
				Unknown	2.1%

2005 (Total = 32,654)

Gender		Age (in 2005)		Race/Ethnicity	
Female	24.5%	Under 35	8.3%	Non-Hispanic White	65.5%
Male	75.5%	35-44	31.5%	Black	4.3%
		45-54	30.7%	Hispanic	11.1%
		55-64	20.1%	Asian/Pacific Islander	16.7%
		65+	9.3%	Amer. Indian/Alaska Native	0.3%
				Unknown	2.2%

***Table 2*: Changes in gender, age, and ethnicity among Texas direct patient care physicians, 2000-2005**

Note: Includes active, direct patient care, non-federal physicians

DPC Physicians Leaving Texas (Total = 8,232)

Gender		Age		Race/Ethnicity	
Female	19.5%	Under 35	0.5%	Non-Hispanic White	76.3%
Male	80.5%	35-44	17.8%	Black	2.9%
		45-54	26.3%	Hispanic	8.4%
		55-64	23.0%	Asian/Pacific Islander	10.3%
		65+	32.3%	Amer. Indian/Alaska Native	0.1%
				Unknown	2.0%

DPC Physicians Entering Texas (Total = 10,900)

Gender		Age		Race/Ethnicity	
Female	34.1%	Under 35	24.1%	Non-Hispanic White	55.7%
Male	65.9%	35-44	49.4%	Black	6.2%
		45-54	18.2%	Hispanic	11.5%
		55-64	5.6%	Asian/Pacific Islander	24.0%
		65+	2.6%	Amer. Indian/Alaska Native	0.3%
				Unknown	2.2%

***Table 3*: Profile of direct patient care physicians entering and leaving Texas, 2000-2005**

Note: Includes active, direct patient care, non-federal physicians

Between 2000 and 2005, more physicians providing direct patient care started their practices in or moved their practices to Texas than stopped practicing in the state. Forty percent (4,310) of new physicians in Texas graduated from the state medical schools, 35 percent (3,843) from other U.S. medical schools, and 25 percent (2,747) from foreign schools. Of those no longer practicing in the state, only half actually left Texas; the others left direct patient care to pursue research, teaching, or administrative positions.

DPC Physicians Remaining in Texas (Total = 21,664)

Gender		Age		Race/Ethnicity	
Female	19.6%	Under 35	0.4%	Non-Hispanic White	70.4%
Male	80.4%	35-44	22.5%	Black	3.3%
		45-54	37.0%	Hispanic	10.9%
		55-64	27.4%	Asian/Pacific Islander	13.0%
		65+	12.7%	Amer. Indian/Alaska Native	0.2%
				Unknown	2.2%

Table 4: Profile of direct patient care physicians retained within Texas, 2000-2005

Note: Includes active, direct patient care, non-federal physicians

Although the cohort of mature professionals 45 to 54 years of age still showed losses, these were partially compensated by young, female, and minority doctors. The percentage of female physicians increased from 19.6 percent in 2000 to nearly 25 percent in 2005. Of physicians who left the state, 80.5 percent were male and 19.5 percent were female. Under-represented minorities constituted almost half of direct-practice physicians who started their practices in or moved their practices to Texas. Less than one-fourth of those who left the state were members of minority groups. Nearly one-fourth (24.1 percent) of doctors who entered the state were under 35 years of age, while only 0.5 percent of those who exited the state fell in that age group.

Retention of Health Professionals

Health professional retention is a core challenge for the border area. Two major forces influence retention rates: the aging of the health workforce and the lack of socioeconomic incentives for health. Many health professionals who serve the border are growing older and retiring without being replaced by younger health workers, and low retention reduces the effectiveness of programs aimed at locating new health professionals in underserved areas. Although Texas welcomed small increases in younger, minority and female health professionals entering the workforce, this only partially compensated for the loss of health/human resources. While not systematically studied, the retention issue emerges informally in almost all gatherings of stakeholders discussing border health. However, lack of historical data allowed the compilation of a retention chart only for Texas.

Figure 3 illustrates the magnitude and urgency of the challenge of maintaining an adequate supply of health professionals in the border region. Among the 1993 cohort of Texas doctors, more than half were no longer practicing in the border area 10 years after graduation. The largest numbers of relocations outside the border took place after the first and third years of practice.

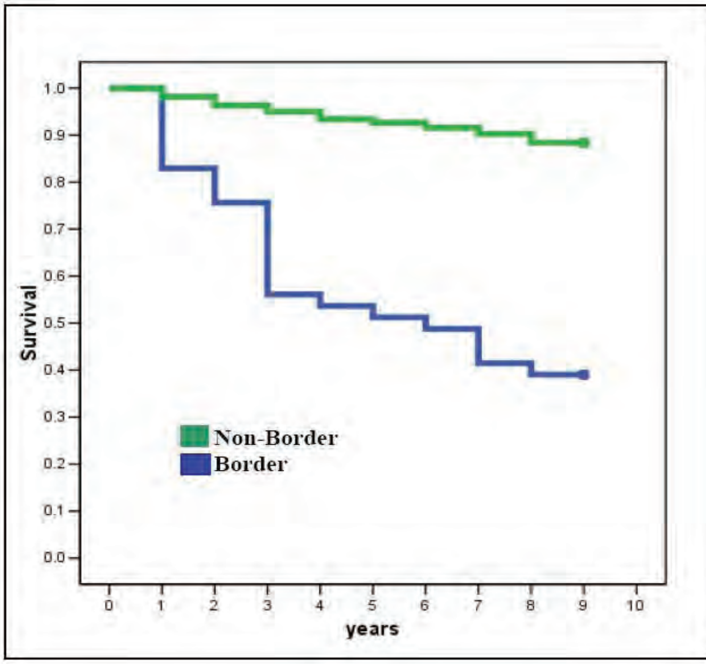


Figure 3: Physician Retention (1993 Cohort) Non-Border and 43 Border Texas Counties*

This assessment was made using the definition of border counties adopted by the Texas Comptroller of Public Accounts, which includes 11 more counties than the 32 so defined by the U.S.-Mexico Border Health Commission.

Ethnic Distribution of Health Professionals

The ethnic distribution of the border workforce relative to the population is difficult to assess because data on ethnicity and race were not available for all border states. Texas, however, does collect ethnicity data for selected health professions[2]. Data from 2003 show that 47 percent of Texas physicians providing direct patient care in the border areas were Hispanic and 35 percent were non-Hispanic whites. In comparison, 84 percent of the Texas border population was Hispanic and 13.6 percent was non-Hispanic white. While a larger proportion of physicians practicing in the Texas border area were Hispanic, a wide gap remained between the ethnic backgrounds of health providers and those of the populations in their service areas. Predictions of rapidly increasing diversity in the population, coupled with modest gains in the number of minority health professionals, suggest that the gap is likely to increase in the near future.

2 While information on race and ethnicity other than licensure-based data were available for other states, these were not comparable to the more current data maintained by the border states and used in the HRSA study.

Oral Health Providers

Statewide data from the 2002 Behavioral Risk Factor Surveillance System indicate that, with the exception of California and Arizona, the percentage of adult border residents visiting a dentist within a year was significantly below both the Healthy Border 2010 objective (75 percent) and the national average (70 percent).

Low utilization rates of oral health care are closely linked to low densities of oral health providers. **Figure 4** shows the ratio of dentists per 100,000 population in the border region. In New Mexico and Texas, the ratio was approximately one-half (29.8) and one-third (19.4), respectively, of the national rate of 60 dentists per 100,000 population. In 2003, approximately one-fifth (18 percent) of New Mexico and one-sixth (15 percent) of Texas border counties did not have a dentist.

Percent visited a dentist within past year:

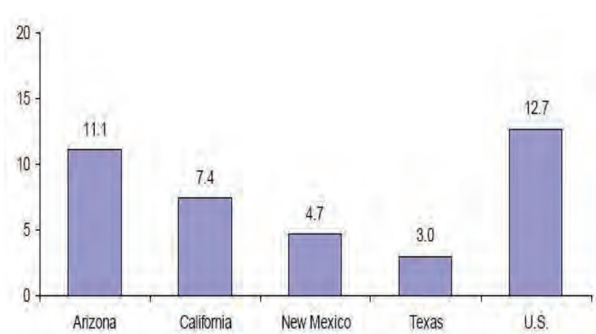
Border Regions:
- Arizona – 69.2
- California – 74.7
- New Mexico –60.9
- Texas – 57.5

Total Border Area – 68.2

Border States – 66.3
U.S. – 69.5

Source: Behavioral Risk Factor Surveillance System (2002).

Dentists per 100,000 Population
Counties Within 62 Miles of the Border



Sources: Arizona Medical Board (2004), and Arizona Board of Osteopathic Examiners in Medicine and Surgery (2004), New Mexico Health Policy Commission (2003, reflects MDs only), and Texas State Board of Medical Examiners (2003); U.S. from Bureau of Health Professions, Health Resources and Services Administration, U.S. Department of Health and Human Services (2000).

Figure 4: Border Oral Health

In California and Arizona, apparently favorable averages conceal maldistribution of oral health providers (see **Figure 5** and **Figure 6**). In 2004, only 57 percent of counties statewide were equal to or above the 2000 national average rate of dentists per 100,000 population. About one-tenth of them (9 percent) had rates that were less than half of the national mean. In Arizona, only Coconino County, a non-border county, compared favorably with the national average, and 40 percent of the state's border counties had rates that were less than half of the national average. Dental shortages occurred mostly in rural areas, and some large rural sub-regions had no dentist at all.

***Figure 5*: Dentists per 100,000 population in California**

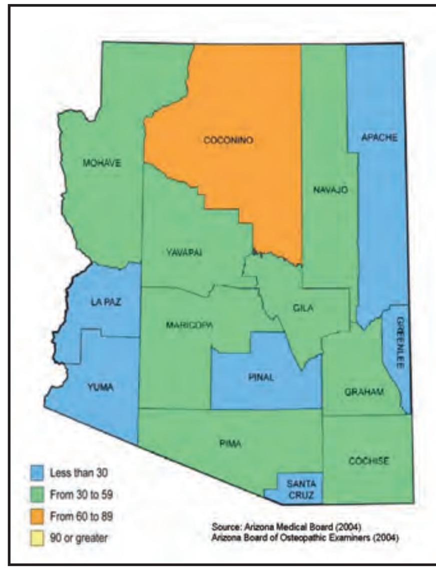


***Figure 6*: Dentists per 100,000 population in Arizona**

Maternal, Infant, and Child Health

Women living in border regions may not receive prenatal care for their unborn children, partly because obstetricians and gynecologists are in short supply[3]. **Figures 7 and 8** present data regarding the availability of gynecologists, obstetricians and nurse midwives in the border region. In 2002, the percentage of women receiving prenatal care during the first trimester of pregnancy in the border region was slightly less than the national average (82 percent and 84 percent, respectively). For infants and children, health risks continue after birth because pediatricians are too few to monitor the physical and cognitive growth of all the children in need of their care. In New Mexico and Texas, which have the highest fertility rates of the border states, problems associated with lack of access to prenatal and pediatric care are likely to increase in intensity.

Chronic Disease Care

Provider-to-population ratios indicate that both primary care physicians and specialists are scarce in the border region. Specialty care physicians and other health professionals play a key role in helping people manage chronic diseases. For instance, diabetes, which is addressed at length in Chapter 7 of this report, is a chronic disease disproportionately affecting the border region. Many

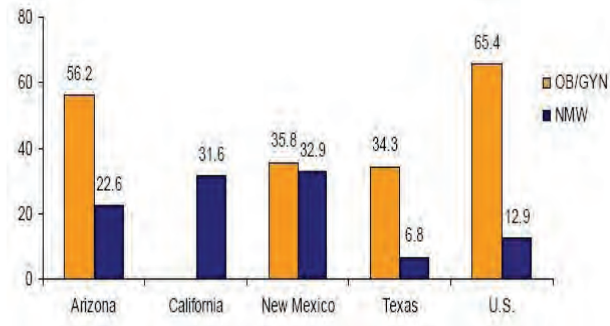
3 County data on the number of physicians by specialty were not available for California at the time of writing.

Percent beginning prenatal care during first trimester:

Border Regions:
- Arizona – 71.6
- California – 84.7
- New Mexico – 67.1
- Texas – 74.7

Total Border Area – 77.8
Border States – 82.4
U.S. – 83.7
- Texas – 74.7
- Total Border Area – 77.8
- Border States – 82.4
- U.S. – 83.7

Obstetricians/Gynecologists and Nurse Midwives per 100,000 Females (Ages 15-44) Counties Within 62 Miles of the Border



Sources: Arizona Dept of Health Services (2002), California Dept of Health Services (2002), New Mexico Dept of Health (2002), Texas Dept of Health (2002), and Births: Final Data for 2002 (U.S.).

Sources: Arizona Medical Board (2004) and Arizona Board of Osteopathic Examiners in Medicine and Surgery (2004); California Department of Consumer Affairs for nurse midwives (2004); New Mexico Health Policy Commission, reflects MDs only (and New Mexico Department of Health for nurse midwives) (2003); and Texas State Board of Medical Examiners (2003); U.S. from Bureau of Health Professions, Health Resources and Services Administration, U.S. Department of Health and Human Services (2000) for physicians and The Registered Nurse Population: Findings from the National Sample Survey of Registered Nurses, 2001, for nurses.

***Figure 7*: Women's and Children's Health**

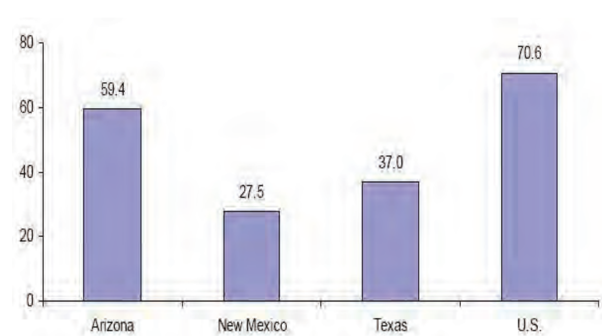
General fertility rates:

Border Regions:
- Arizona – 72.9
- California – 69.6
- New Mexico – 74.4
- Texas – 104.0

Total Border Area – 81.8

Border States – 72.5
U.S. – 64.8

Pediatricians per 100,000 Children (Ages 0-17) Counties Within 62 Miles of the Border



Sources: Arizona Dept of Health Services (2002), California Dept of Health Services (2002), New Mexico Dept of Health (2002), Texas Dept of Health (2002), and Births: Final Data for 2002 (U.S.).

Sources: Arizona Medical Board (2004), and Arizona Board of Osteopathic Examiners in Medicine and Surgery (2004), New Mexico Health Policy Commission (2003, reflects MDs only), and Texas State Board of Medical Examiners (2003); U.S. from Bureau of Health Professions, Health Resources and Services Administration, U.S. Department of Health and Human Services (2000).

***Figure 8*: Children's Care**

health professionals are involved in the care of a diabetic patient. Primary care physicians help monitor patients' blood glucose levels and their overall health status; ophthalmologists assist in the evaluation and treatment of glaucoma and other vision problems; and orthopedic surgeons are needed in complications calling for amputation of extremities. Other specialists such as endocrinologists, cardiologists, and mental health professionals may also be involved in the care of the diabetes patient.

Table 5 shows ratios of primary care and selected specialty care physicians involved in diabetes treatment in the border region per 100,000 population. While the average border ratio was only one-fourth less than the national average, large discrepancies existed between counties in different states. In the Arizona border counties, the ratio (89.6) was actually higher than the national average (85.0). California border counties fared less well, with a ratio of 62.7. In New Mexico (47.7) and Texas (48.9), ratios were only a few percentage points above half of the national average. It is not surprising that in New Mexico and Texas, the mortality rates for diabetes are 36 and 40 deaths per 100,000 population, respectively, notably higher than the national rate of 25.

Age-adjusted mortality rates for diabetes:

Border Regions:
- Arizona – 20.7
- California – 18.6
- New Mexico – 36.3
- Texas – 40.3

Total Border Area – 26.1

Border States – 25.7
U.S. – 25.4

	Primary Care Physicians*	Ophthal-mologists	Orthopedic Surgeons
United States	85.0	6.1	6.7
Total Border	**62.3**	**NA**	**NA**
Arizona	89.6	7.4	7.5
California	62.7	NA	NA
New Mexico	47.7	3.8	3.1
Texas	48.9	3.2	3.7

Sources: Arizona Dept of Health Services (2002), California Dept of Health Services (2002), New Mexico Dept of Health (2002), Texas Dept of Health (2002), and Births: Final Data for 2002 (U.S.).

Sources: (1) Arizona: Arizona Medical Board (2004), and Arizona Board of Osteopathic Examiners in Medicine and Surgery (2004); (2) The Practice of Medicine in California: A Profile of the Physician Workforce. San Francisco CA: California Workforce Initiative at the UCSF Center for the Health Professions. February 2001, for primary care physicians; (3) New Mexico: New Mexico Health Policy Commission (2003), reflects MDs only; (4) Texas: Texas State Board of Medical Examiners (2003); and, (5) U.S.:: American Medical Association Masterfile (2006) with 2005 estimates for population as 2006 were not available.

***Table 5*: Medical Care for Chronic Diseases: The Case of Diabetes**

Mental Health Professionals

Border communities need mental health professionals to effectively address mental health conditions, which may heighten the individually and socially damaging effects of low wages, low productivity, and unemployment. Shortages of mental health professionals have a substantial negative impact on these communities' quality of life. In each state, the psychiatrists available to address mental health issues in the border regions were below the national average of 12.7 psychiatrists per 100,000 population (**Figure 9**). California, New Mexico, and Texas face the greatest shortages with only 7.4, 4.7, and 3.0 psychiatrists per 100,000 population, respectively.

Years of potential life lost/ mortality rate due to suicide:

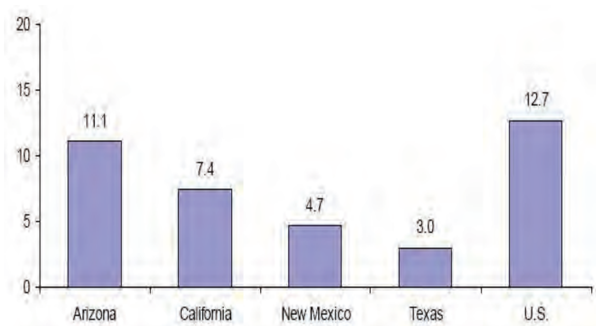
Border Regions:
- Arizona – 336.9 / 15.5
- California – 227.8 / 10.6
- New Mexico – 445.9 / 20.0
- Texas – 143.3 / 6.5

Total Border Area – 229.0 / 10.7

Border States – 237.0 / 10.9
U.S. – 261.6 / 10.9

Sources: Arizona Dept of Health Services (2002), California Dept of Health Services (2002), New Mexico Dept of Health (2002), Texas Dept of Health (2002), and National Center for Injury Prevention and Control, WISQARS Years of Potential Life Lost Reports (2001).

Pediatricians per 100,000 Population
Counties Within 62 Miles of the Border



Sources: Arizona Medical Board (2004), and Arizona Board of Osteopathic Examiners in Medicine and Surgery (2004); The Center for Health Professions, University of California, San Francisco (2003), reflects 2000 data; New Mexico Health Policy Commission (2003, reflects MDs only); and Texas State Board of Medical Examiners (2003); U.S. from American Medical Association Masterfile (2006), where 2005 population estimates used as 2006 were not available.

***Figure 9*: Mental Health**

Health Workforce Training

Most educators, health administrators, and policy makers who are engaged in health professional workforce development in the border region agree that training health professionals where they are needed is a key strategy for encouraging graduates to practice in border communities. Historically, health professional training has been accomplished in large urban centers far from the border, and recent efforts to change this state of affairs have not yet been evaluated. Also, no scientific study on the border workforce has been undertaken to prove a link between training location and choice of practice location, and the evidence so far is at best indirect. However, many unpublished and informal surveys, reports to funding agencies, and informal investigations by administrators of educational institutions suggest that those students who were trained in underserved areas or were recruited from those areas were more likely to return to those locations to practice.

In a related area of research, studies (Rabinowitz et al., 2001; Rosenthal, 2000) have been conducted on workforce shortages in rural areas and on the positive impact of medical training that includes exposure to rural medicine on practice location decisions. These studies provide strong evidence that a combination of factors, such as the selection of matriculates with appropriate background and career goals, and offering training that includes clinical experiences in rural medicine, increase the number of practitioners locating in rural underserved areas. The research is convincing and useful for guiding educational programs even if not successful in isolating the factors as independent predictors of rural practice (Ranmuthugala et al., 2007). In addition, several studies have demonstrated that health professionals who are members of minority groups are more likely to practice in underserved areas (Cohen, et al., 2002; Kington, et al., 2001).

The accumulation of this informal and formal knowledge has motivated HRSA's Bureau of Health Professions to support the development of a guidebook for increasing the number of disadvantaged and minority students entering the health professions, with the ultimate goal of increasing the health status of the border. A consortium of the U.S.-Mexico Border Centers of Excellence will develop the guidebook[4].

Some federal programs are specifically aimed at addressing health workforce issues of underserved areas and offer great potential for an effective Border workforce policy. However, their impact on Border health professionals has not been adequately evaluated. Notable among them are the special J-1visa for foreign physicians, the H1-B visa for foreign-born employees without residence privileges, and the National Health Service Corps (NHSC) program[5]. In 1998, Baer, Ricketts, Konrad and Mick reported that international medical graduates accounted for a greater proportion of primary care physicians in rural areas with physician shortages. It is estimated that the NHSC loan repayments and other assistance programs will support 3,400 clinicians in the HRSA FY 2009 proposal, with half of them to be assigned to serve in HRSA-supported health centers.

Community Health Workers

Given persistent health workforce shortages, successfully addressing communities' different needs may require innovative strategies such as adding *promotores/promotoras* and other community health workers (CHWs) to the health-care team. As defined by the Community Health Worker National Workforce Study (2007):

> Community health workers are lay members of communities who work either for pay or as volunteers in association with the local health-care system in both urban and rural environments and usually share

4 More information about the guidebook project is available at the website of the University of Texas Health Science Center at San Antonio, Medical Hispanic Center of Excellence, www.uthscsa.edu/hcoe/consortium.asp.

5 http://nhsc.bhp.hrsa.gov/

ethnicity, language, socioeconomic status and life experiences with the community members they serve. CHWs offer interpretation and translation services, provide culturally appropriate health education and information, assist people in receiving the care they need, give informal counseling and guidance on health behaviors, advocate for individual and community health needs, and provide some direct services such as first aid and blood pressure screening.

In other words, community health workers work in the gap between social services and health systems. They are employed under many job titles, including peer health educator, outreach worker, community health advocate, and in Mexico, Latin America, and Hispanic communities in the United States, are referred to as *promotores* and *promotoras*[6].

A Community Health Worker National Workforce Study (2007) has collected detailed data on this emerging workforce nationwide and in the border region[7]. In the four border states combined, nearly 16,000 community health workers, both paid and volunteer, provided services in their communities – about 26 per 100,000 population. It is unknown how many were working in the border region. Nationally, there were an estimated 85,879 community health workers in 2000 – about 31 per 100,000 population. Evidence regarding the effectiveness of community health workers in complementing medical teams to improve health outcomes is accumulating and research on this sector of the workforce is just now beginning to produce acceptable results (HRSA, 2007).

Conclusion and Recommendations

The following conclusions are an attempt to link the border workforce issues listed at the beginning of the chapter with the findings of the data-gathering project sponsored by HRSA. The comments deliberately go beyond the details of the data to draw, in a few bullet statements, the larger and complex picture of challenges facing the border health workforce, Hispanic health, and health policy.

6 More specifically, the terms are used to describe advocates of the welfare of their own communities who have the vocation, time, dedication, and experience to assist fellow community members in improving their health status and quality of life. Recently the terms have been interchangeably, despite some opposition, with the term community health workers.

7 The two-year study was conducted by the University of Texas Health Science Center at San Antonio Regional Center for Health Workforce Studies under a contract with the HRSA Bureau of Health Professions, Evaluation and Analysis Branch, The research, accomplished in collaboration with several national and state organizations, chronicles for the first time, in all the 50 states, the involvement of community health workers in the delivery of health services, summarizes the legislative process relative to their integration in the U.S. health-care system, describes the skills required by employers and provides national and state workforce estimates. Completed in 2007, the study is available in its entirety at the HRSA web site (http://bhpr.rsa.gov/healthworkforce/) and at the RCHWS/UTHSCSA website (http://www.uthscsa.edu/rchws/projects.htm).

In 1989, the first National Action Forum on Health Policy and the Hispanic was sponsored in San Antonio, Texas by the Robert Wood Johnson Foundation. It attracted an unprecedented group of scholars, health researchers, public figures, educators, administrators of health programs, and health professionals (Furino, 1992). The results were so powerful in their vision of a better future for the underserved and so terse in their message of what was needed to successfully address the problems that they produced another unprecedented event: the first issue of the Journal of the American Medical Association to be totally dedicated to Hispanic health (JAMA, 1991; Furino & Munoz, 1991). The Hispanic health issues addressed in that volume, published 18 years ago, are strikingly similar to the border problems of today. The challenges are complex and – despite increased public recognition of the urgency of the problems, the goodwill of many dedicated individuals, organizations, and public entities, and some progress – the problems linger. These problems need the strongest resolve of private and public organizations, and the public at large, for their solution.

This chapter provides a summary of the available data on the health workforce in border state sub-regions. Collecting, verifying, and organizing these data represent an important first step that should be followed by additional research and analyses linking the data to the available relevant literature. The health and workforce indicators vary greatly among the border states and the regions and counties within them. They also vary between rural, urban and suburban areas. But these differences are often hidden in the aggregate data and averages used to make policy and to design intervention programs. Therefore, a key objective for stakeholders in the public and private sectors should be the development of reliable community-level data. Without this data, it is difficult to make appropriate policy decisions and develop effective intervention programs. Finally, border health workforce problems are the result of multiple factors and therefore require multiple, decentralized, and simultaneous interventions.

The following recommendations suggest some of the challenges that must be addressed in creating an adequate health workforce for the border. Although it may appear overly ambitious, the list is far from comprehensive. Still, even modest modification, enhancement, or better funding of existing programs could achieve many improvements in all of the recommended action items.

- Programs aimed at producing more health professionals need to be complemented by appropriate regional and local economic development programs to support retention of providers and access by the underserved. Most importantly, evidence-based interventions need to be developed in accordance with logical rationale provided by solid research and data-collection strategies.
- National and international partnerships are needed to create a data infrastructure on both sides of the border. This infrastructure must be

capable of producing information that is timely, accurate, longitudinal, and comparable over time and space.

- Better information is needed on workforce size, characteristics, practice location, training, and full-time-equivalent (FTE) measures of health services for specific population groups. The productivity of the health workforce is a better indicator that its size of the available supply of health services. An inadequate health workforce data infrastructure leaves policy makers uninformed and produces a vicious circle of data shortage and inaction where interventions are needed most.
- An adequate data infrastructure needs to be coupled with community-based research endeavors that include community members in their planning and implementation. The health problems of the border region are generated in diverse border communities and must be solved with interventions that reach those many communities and are sensitive to their differences.
- Workforce shortage data, now available mostly at the county level, need to be computed from reliable and current addresses on practice location that would allow smaller area indicators. Those data need to be complemented by estimates of true service areas, with the actual FTE services delivered to the underserved, and with data on the capacity of practices and clinical facilities, as well as their distances from providers and neighborhoods. In addition, periodic assessments of the mobility of providers need to be conducted.
- Reliable estimates are needed of the size and location of the uninsured and underserved populations receiving care, and of those needing care but not qualifying for public assistance.
- Better understanding of and better data on cross-border health-care activity are needed to estimate total demand for health care. Currently, only a few local studies (Chacón-Sosa & Otalora-Soler, 1988; Landeck & Garza, 2002; Macias & Morales, 2001; Tabet & Wiese, 1990) provide information on border residents who seek services in Mexico, and these do not allow generalizations to the rest of the border population.

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CHAPTER 3

ACCESS TO AND USE OF HEALTH CARE

Adequate access to health care and related health services can increase appropriate use of the health care system, increase quality and years of healthy life, and in due course improve health outcomes (HHS, 2000). Appropriate use of health care services can also help control health-care spending and ultimately reduce or eliminate health disparities (Starfield 1996, 1998; Starfield & Simpson, 1993).

Healthy Border 2010 recognizes the role played by access to health care in improving overall health status. Two of the 25 Healthy Border indicators directly address access to health care provider: "Reduce by 25 percent the population lacking access to a primary health care;" and "Raise preparation of population using oral care to 75 percent annually" (Healthy Border 2010, 2003, p.71). However, improved access to health care can also have a direct and positive impact on rates of cancer, chronic disease, infectious disease, and immunization. Oral health, chronic disease management, and health-related behaviors all improve with access to health care.

Yet those who live in the U.S.-Mexico border region face multiple barriers to accessing health care and related services. These barriers include lack of health insurance coverage, health care costs, lack of health care infrastructure, health care workforce shortages, language, cultural attitudes, and logistical issues such as transportation and child care.

Of these barriers, the most salient is lack of health insurance coverage. Health insurance coverage is the most important predictor of gaining access to health care (Centers for Disease Control [CDC], 2004; Cohen, Hao, & Coriaty, 2004; Institute of Medicine [IOM], 1993; Parchman, 2001). Most national surveys that measure access to health care use health insurance status as a primary metric, based on the rationale that "measurement of lack of health insurance coverage for a lengthy period of time is associated with persistent lack of access to health care in individuals who may be at high risk of not obtaining preventive services as well as care for illness and injury" (Cohen 2004; IOM, 1993; Sambamoorthi & McAlpine, 2003, pp.478).

The number of U.S. residents without health insurance is increasing rapidly. Data from the Current Population Survey (CPS) indicate that in 2003, 16 percent of the U.S. population, or 45 million people, were without any health insurance (Denavas-Walt, Proctor, & Mills, 2004). Data used in this chapter show that the border region, as well, is severely affected by this troubling fact.

This chapter provides an analysis of access to health care for the population along the U.S.-Mexico border based on health insurance status and use of selected health services. Section one provides an assessment of access to health care based on health insurance coverage. Section two assesses use of selected health services as a function of health insurance coverage status.

Methods

This study uses the National Health Interview Survey (NHIS) definitions of private and government health insurance coverage. Private health insurance is coverage by a plan provided through an employer or union or purchased by an individual from a private company. Government health insurance includes the federal programs Medicare, Medicaid, and military health care; State Children's Health Insurance Programs (SCHIP); and individual state health plans. The NHIS does not classify types of insurance as mutually exclusive, and people can be covered by more than one plan during the year (Cohen & Martinez, 2004).

For this study, data for four years (2000-2003) from the in-house version of the NHIS were merged and analyzed. The NHIS is a household, multistage probability sample survey conducted annually by the National Center for Health Statistics at the Centers for Disease Control and Prevention (CDC). Each year, NHIS collects data from approximately 100,000 individuals across the nation. The NHIS monitors the health of the U.S. population through the collection and analysis of data on a broad range of health topics. The NHIS was justified for use in this study because it includes a well-constructed health insurance module that historically reported low non-response rates. NHIS staff performs extensive cognitive testing of the questions used. Most importantly, specific health insurance information obtained through the NHIS is derived directly from the health-plan card of the individual[1].

Percentages and adjusted standard errors of the variables under study were

1 Detailed information about the NHIS and the methodology used in this study can be found in the Appendix to Chapter 3.

stratified by ethnicity (Hispanic[2] versus non-Hispanic[3]) and by region of residence (border counties, non-border counties in the border states, four border states combined, and the United States). The analysis focused on the insured versus non-insured populations, using health insurance status definitions provided in the NHIS documentation[4]. For most variables, data are limited to the adult population (18 years of age or more) although information for both adults and children is available for selected variables.

I: Access to Health Care Based on Health Insurance Status

Health Insurance among Hispanics

National surveys consistently show disproportionately low rates of health insurance among Hispanics. The CPS reports that, among ethnic groups, Hispanics disproportionately lacked health insurance compared to any other groups (Denavas-Walt et al., 2004; see **Figure 1**). Likewise, the 2004 NHIS found that Hispanics were four times more likely than non-Hispanic whites and 2.5 times more likely than non-Hispanic Blacks to be uninsured for more than one year (Cohen et al., 2004).

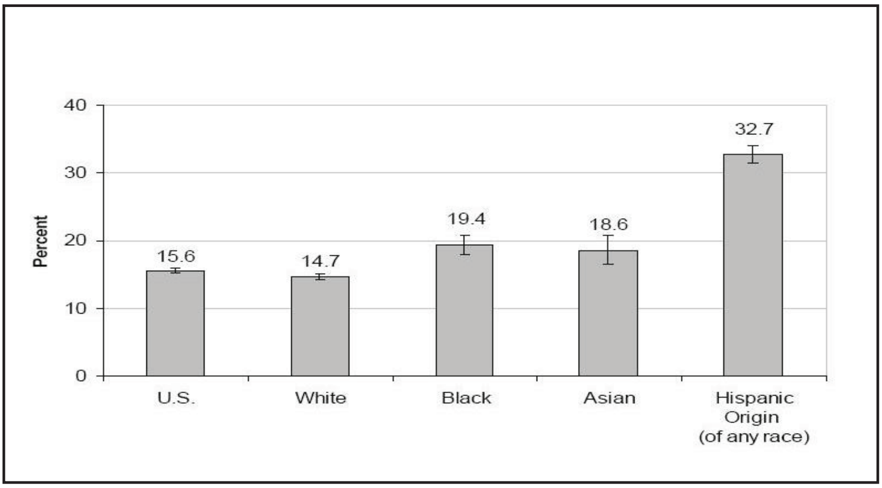

***Figure 1*: Percent of population without health insurance coverage by ethnicity, United States, 2003**

Source: DeNavas-Walt, C. Proctor, B., & Mills, R. Income, Poverty, and Health Insurance Coverage in the United States: 2003. U.S. Census Bureau, Current Population Survey, (2004)

2 Hispanic persons may be of any race, including persons of Mexican, Puerto Rican, Cuban, Central and South American, or Spanish origin.
3 Non-Hispanic of any race.
4 A person was defined as uninsured if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, state-sponsored or other government-sponsored, or military health plan at the time of the interview. A person was also defined as uninsured if he or she had only Indian Health Service coverage or had only a private plan that paid for one type of services such as accidents or dental care.

These results were mirrored by those of the Behavioral Risk Factor Surveillance System (BRFSS), a national telephone survey conducted by the CDC. Data from the 2001-2002 BRFSS showed that Hispanic respondents were significantly less likely than non-Hispanic respondents to have health insurance (76.2 percent versus 90.6 percent); to have less than one regular personal health-care provider (68.5 percent versus 84.1 percent); and to have less regular access to a place for care (93.4 percent versus 96.2 percent; CDC, 2004). On the basis of the overwhelming historical survey data available, Valdez and colleagues (1993) concluded that "Latinos have the worst health insurance coverage of any ethnicity group in the country" (p. 889). These data, as well as the data presented in this report, suggest that health insurance coverage for Hispanics has been inadequate for many years.

Other literature suggests that lack of health insurance coverage and consequent delay and limited access to health care among Hispanics contribute to their age-adjusted potential for life lost before age 75 (CDC, 2004), poor health status in general, and high rates of morbidity and mortality (Lieu, Newacheck, & McManus,1993). This problem is heightened for Hispanics who live in the U.S.-Mexico border region. Hispanics living in the border region are more likely to experience barriers to access to and use of health care services than any other Hispanic group in the United States. The southwest region of the nation, which includes states with higher concentrations of residents of Mexican descent, consistently displays the highest rate of uninsured population in the nation (Cohen et al., 2004; Parchman & Byrd, 2001).

Health Insurance Coverage along the Border

Lack of health insurance coverage and consequent lack of access to health care is more prevalent in counties and states that lie along the U.S.-Mexico border. As shown in **Figure 2**, the border states of Texas and New Mexico have historically reported two of the highest uninsured rates in the nation.

Two studies offer additional perspectives on barriers to health care access in the border region. In 1997, Parchman and Bird used the BRFSS to investigate lack of access to health care in El Paso, Texas, the largest U.S. city directly on the U.S.-Mexico border. The researchers found that approximately two of every five residents in El Paso were uninsured. As in the rest of the United States, having health insurance was one of the most important predictors of realized access to health care in terms of regular check-ups and access to regular sources of care. The investigators also found that respondents who spoke only Spanish reported more limited access to health care than those who spoke both Spanish and English. Similarly, Landeck and Garza (2000) found substantial inequities in access to health care in Mexican-American communities in the

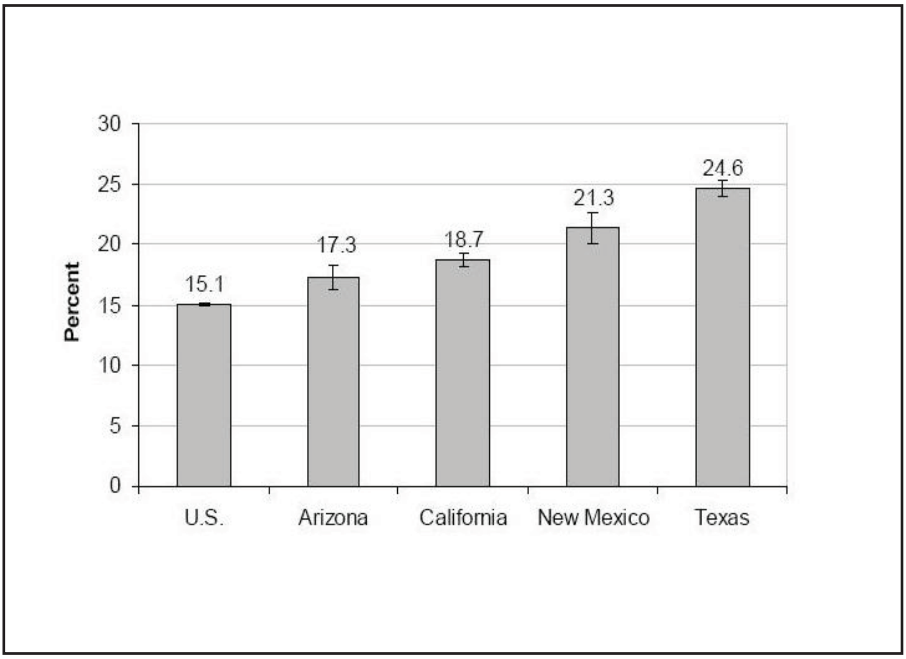

***Figure 2*: Percent of the population without health insurance coverage by state, 2001-2003**

Source: Denavas-Walt et al., 2004, Income, Poverty, and Health Insurance Coverage in the United States: 2003. U.S. Census Bureau, Current Population Survey, 2003

border city of Laredo, Texas. With support of the Laredo Health Department, the researchers randomly performed more than 1,000 interviews in Laredo's nineteen statistical census tracts. In addition to finding a significant number of uninsured individuals, Landeck and Garza also found problems in access to and availability of preventive health care services for a considerable segment of Laredo's population.

These studies suggest that residents of El Paso and Laredo have inadequate access to health care, largely due to lack of health insurance. The findings also suggest that lack of health insurance coverage severely limits access to health care, not only in El Paso and Laredo but throughout the U.S.-Mexico border region, where population characteristics, socio-economic status, health care resources, and health insurance coverage rates are analogous. The problem is likely to grow in magnitude because of the rapid population growth and low socio-economic status of the area (Parchman & Bird, 2001; Warner, 1991).

However, both studies also documented the use of an alternative route to accessing health care. Hispanic residents of both cities said they regularly crossed the U.S.-Mexico border into Mexico to seek health care services. In this respect, both studies echoed the findings of other published reports on health care access in the border region (Hunter et al., 2003; Landeck & Garza, 2002; Macias & Morales, 2001; & Seid, Castañala, Mize, Zivkovic, & Varni, 2003).

Lack of Health Insurance Coverage by Type

To maintain consistency with previous work, three NHIS definitions of lack of health insurance were adopted in this analysis: current, short-term, and long-term. Because the terms are not mutually exclusive, an individual may be counted in more than one of the three measures.

As Cohen and Martinez (2004) point out, these definitions allow identification of different policy-relevant perspectives pertinent to the population under study. For example, current lack of health insurance coverage (CLHIC) helps to identify the segment of the population that may experience barriers to obtaining needed health care services and for whom access to care is perceived as extremely limited. On the other hand, the categories of short or long-term lack of health insurance coverage help to reveal obstacles to accessing care, including preventive health services and prolonged care for major illnesses.

Current lack of health insurance coverage

CHLIC is defined as not having health insurance at the time of the interview. Because of the relevance of this topic, estimates of lack of health insurance coverage were calculated for the total population instead of the adult population. Analysis of prevalence of individuals in the CLHIC group provides an overview of the population that may experience barriers to obtaining needed health care. In 2000-2003, the CLHIC for the border[5] was significantly higher than the CLHIC for the United States (22.9 percent versus 14.7 percent)[6]. The border rate was 56 percent higher than the national rate, as illustrated in **Figure 3**.

CLHIC in relation to ethnicity differed substantially between the border and the United States (see **Figure 4**). Hispanics at the border were three times more likely than non-Hispanics who lived in the same region to be without health insurance at the time of the interview (38.2 percent versus 12.0 percent). In comparison, 32.7 percent of Hispanics nationwide reported not having health

5 The cluster of U.S. counties along the U.S.-Mexico border were identified as one epidemiological unit and compared to the United States in several fashions. Additional comparisons among the border counties, versus the cluster of non-border counties, and the four border states combined (Arizona, California, New Mexico, and Texas) can also be accomplished by using the detailed tables provided in the Appendix to Chapter 3.

6 Statistical tests for measuring significance of differences between two point estimates were performed using a two-tail Z test at the 0.05 level, assuming independence. For multiple comparisons, statistical significance was assessed by judging the overlap of 95 percent confidence intervals for calculated rates. Overlapping confidence intervals represent non-statistically significant relationship. Lack of comments regarding the difference between two estimates does not necessarily imply that the difference was tested and found to be not significant.

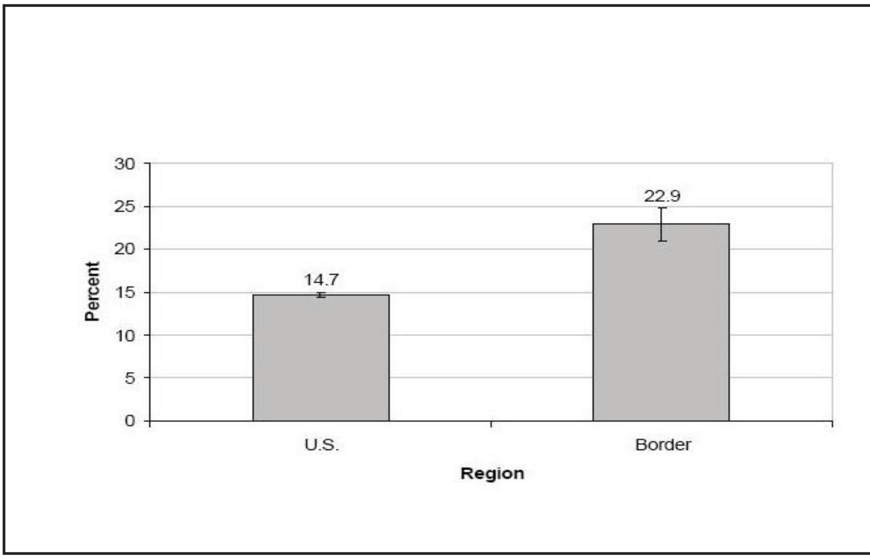

Figure 3**: Current lack of health insurance coverage, United States versus U.S.-Mexico border region, 2000-2003**

Source: Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

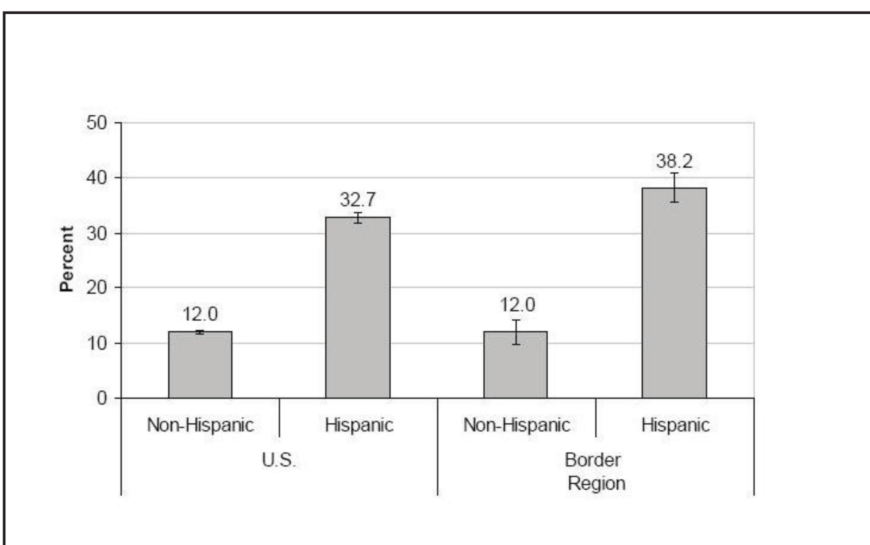

Figure 4**: Percent of the population without health insurance coverage at time of interview (current lack of health insurance coverage), by ethnicity, 2000-2003**

Source: Data retrieved in 2005 from the 2000-2003 NHIS in-house data file insurance at the time of the interview. Thus, the CLHIC rate for border-area Hispanics was 17 percent higher than for U.S. Hispanics. In contrast, rates of CLHIC for non-Hispanics in the border area were comparable to CLHIC rates in the United States as a whole.

CLHIC status presents a clear picture of the disparity in insurance coverage between ethnic groups in the border region as well as in the United States. The border population had the highest percentage of Hispanics without health insurance coverage at the time of the interview. However, a parallel trend is identifiable at the border-state level and in non-border counties (see **Table 1**[7]). This finding supports previous work by Cohen and others, who found that CLHIC was concentrated in the southwest region (Cohen et al. 2004; Cohen & Martinez, 2004; DeNavas et al. 2004).

Short and long-term lack of health insurance

Short-term lack of health insurance coverage (STLHIC) is defined as not having any type of insurance coverage for at least part of the 12 months prior to the interview. Long-term lack of health insurance coverage (LTLHIC) defines the group of individuals who report spending more than 12 months without insurance coverage. As **Figure 5** shows, 27.2 percent of the uninsured U.S. population was in the STLHIC group. In contrast, only 17.9 percent of the total border population was classified as STLHIC. Individuals who were uninsured and lived in the border region were more likely to experience LTLHIC than the rest of the U.S. population (82.1 percent versus 72.8 percent).

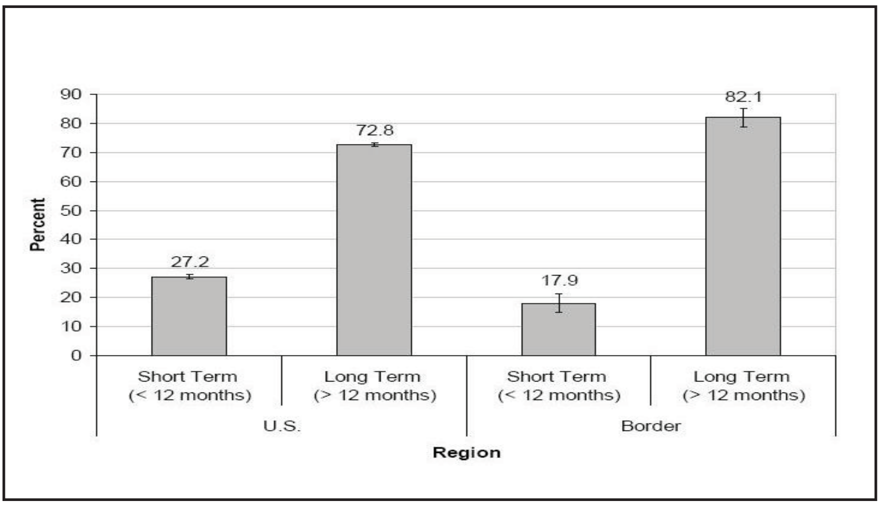

***Figure 5*: Percent distribution of uninsured population by time without insurance, 2000-2003**

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

7 All tables are found in the Appendix to Chapter 3.

Figure 6 displays STLHIC and LTLHIC estimates by ethnicity for the uninsured United States and border populations. Uninsured border Hispanics were significantly more likely than any other group to be classified as LTLHIC (86.9 percent). Estimated LTLHIC for uninsured border Hispanics was 27 percent higher than for the uninsured non-Hispanic community in the same region (68.6 percent) and five percent higher than the national estimates for uninsured Hispanics (82.5 percent). At both border and national levels, ethnic disparities were noticeable (see **Table 2**). In general, almost 8 of every 10 uninsured Hispanics spent more than a year without health insurance, compared to 7 of every 10 uninsured non-Hispanics. These rates were similar for the both United States and border regions.

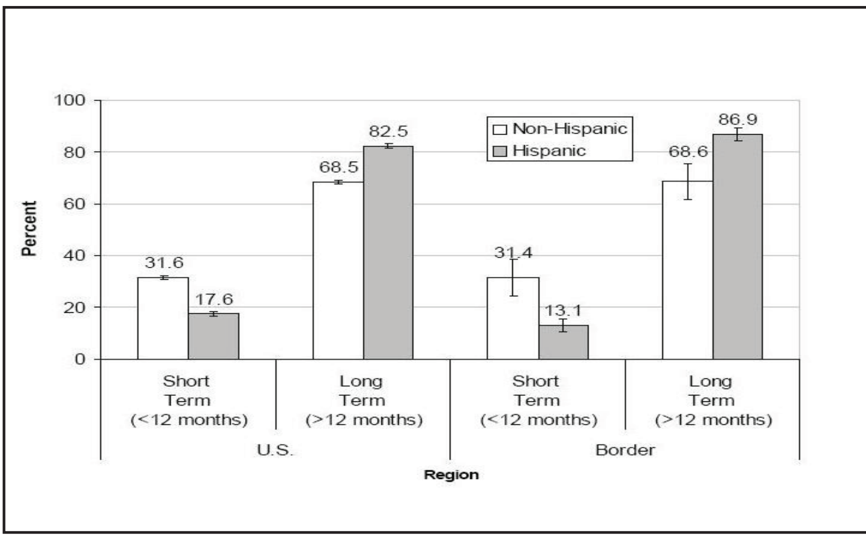

***Figure 6*: Percent distribution of uninsured population by ethnicity and time without insurance, 2000-2003**

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

Inability to Afford General Health Care, Oral, or Behavioral Health Services

Although health insurance status is a critical determinant of access to health care, even those with health insurance coverage may not be able to afford needed health care because of alarmingly high out-of-pocket costs for deductibles or co-payments. During the period 2000-2003, approximately 4.8 percent of the U.S. adult population (18 years and over) who needed medical care did not receive it because they could not afford it. Similarly, in the border region, almost 1 out of 20 adults did not receive health care because they could not afford it (see **Table 3**).

Inability to afford health care and ethnicity

Inability to obtain health care due to cost was associated with ethnicity. Overall, Hispanic adults were more likely to report inability to afford medical care than were non-Hispanics, as shown in **Figure 7**. The percentage of Hispanics residing in the border region who could not afford needed medical services was 40 percent greater than that of border non-Hispanics (6.0 percent versus 4.3 percent). At the national level, the percentage of Hispanics who were unable to afford needed care was 16 percent higher than that of non-Hispanics (5.4 percent versus 4.7 percent). In both regions, the disparity by ethnicity was statistically significant.

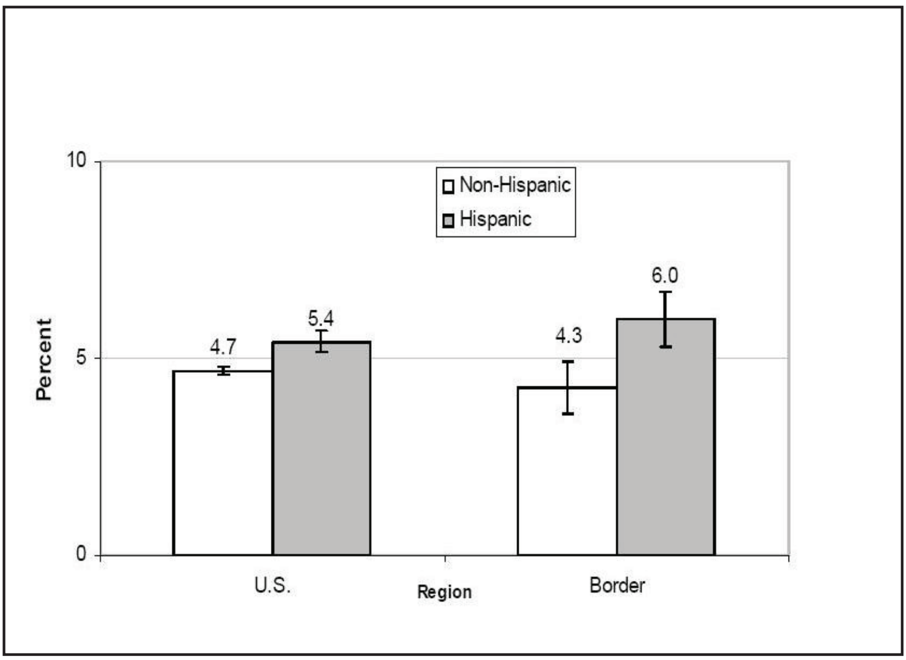

***Figure 7*: Percent of the adult population who needed medical care but did not get it because they could not afford it, by ethnicity, 2000-2003**

(Results are based on answers to the following question: "During the past 12 months, was there any time when [name of individual] needed medical care, but did not get it because [name of individual] could not afford it?")

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

Health insurance plays a pivotal role in a person's ability to afford health care services. In 2000-2003, about 3 out of every 100 insured individuals reported that they had not received needed medical services in the past year because they could not afford them. **Figure 8** shows this relationship. This finding was true for both Hispanics and non-Hispanics. No statistical difference was identified between the two groups. However, another picture emerged for the uninsured population. Uninsured non-Hispanics were much more likely to report that they could not afford medical services than were uninsured Hispanics. In all geographic regions under study, uninsured non-Hispanics reported the highest percent of inability to afford health-care services.

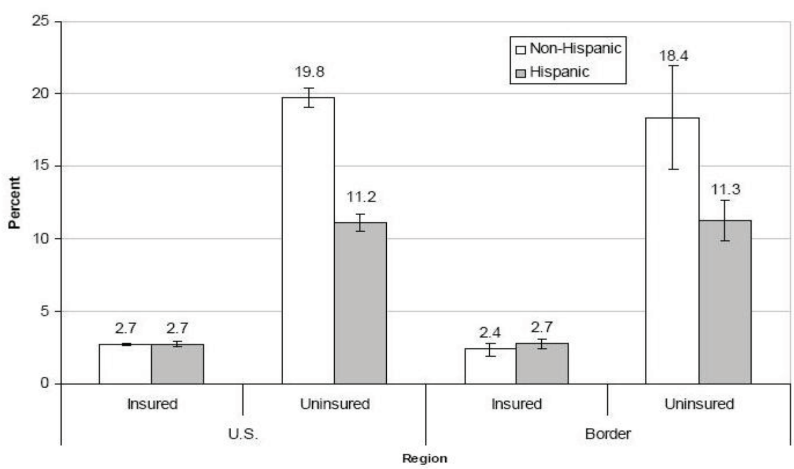

***Figure 8*: Percent of the population who needed medical care but did not get it because they could not afford it, by ethnicity and insurance status, 2000-2003**

(Results are based on answers to the following question: "During the past 12 months, was there any time when [name of individual] needed medical care, but did not get it because [name of individual] could not afford it?")

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

The percentage of uninsured border Hispanics who reported that they could not afford medical services (11.3 percent) was more than three times greater than that of insured border Hispanics (2.7 percent). This trend was mirrored at the national level, where the difference between Hispanics with or without health insurance was noteworthy. In both regions, the disparity between insured and uninsured populations was statistically significant.

Inability to afford oral health care for the past year

Adults living in the border region were on average more likely to report the inability to afford oral health care than were adults in the United States (11.5 percent versus 9.4 percent). Although the proportion of adults who could not afford oral health services at the border differed statistically from the national estimate, the difference between the border and the rest of the Southwest region was not statistically significant (see **Table 4**).

Hispanics were more likely than non-Hispanics to report the inability to afford oral health services. This disparity was particularly apparent in the border region, where the percentage of Hispanics who could not afford oral health services was more than double that of non-Hispanics (16.8 percent versus 8.1 percent). Geography was also a key factor in determining ability to afford oral health services. The percentage of Hispanics in the border region who could not afford oral health services was 46 percent greater than the estimate for the adult U.S. Hispanic population.

People who did not have health insurance were less likely to be able to afford oral health care than were people who had insurance. As **Figure 9** shows, this was true for both Hispanics and non-Hispanics. The proportion of uninsured border adult Hispanics who were unable to afford oral health care was more than twice that of insured border Hispanics (27.0 percent versus 8.5 percent). Disparity in the ability to afford oral health care based on health insurance status was exhibited in every region (see **Table 4**). Nationally, uninsured Hispanics were less likely to be able to afford oral health care than were uninsured non-Hispanics. However, ethnicity did not make a difference between uninsured populations at the border.

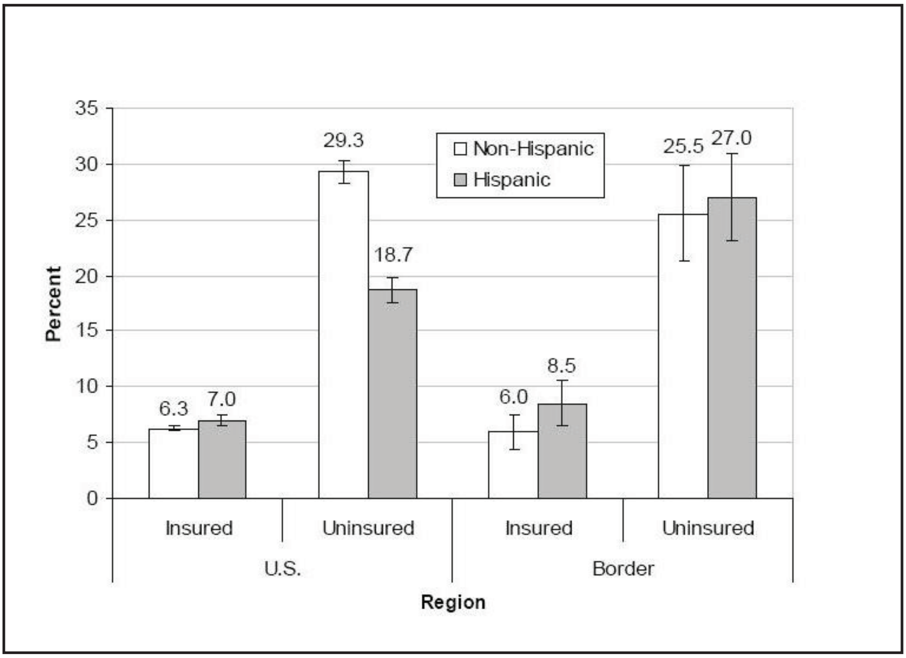

***Figure 9*: Percent of the adult population who could not afford oral health care for previous 12 months, by ethnicity and insurance status, 2000-2003**

(Results are based on answers to the following question: “During the past 12 months, was there any time when you needed any of the following (dental care including check-ups) but didn’t get it because you couldn’t afford it?”)

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

Inability to afford mental health services for the past year

In 2000-2003, adults in the border region who needed mental health services were more likely to report inability to afford those services than were adults in the United States as a whole (2.7 percent versus 1.9 percent; see **Table 5**). Hispanics who lived along the border were more likely to report the inability to afford behavioral health services than any other ethnic group, as shown in **Figure 10**. The percentage of adult Hispanics in the border region who reported inability to afford behavioral health services was 147 percent higher than adult non-Hispanics in the same region (4.2 percent versus 1.7 percent) and almost two times that of U.S. Hispanics.

Both Hispanic and non-Hispanic groups were more likely to report inability to afford mental health services if they did not have health insurance. For the insured population, point estimates were found to be alike (see Table 5). However, within the uninsured adult population, ethnicity affected the ability to afford behavioral health services at the national, but not at the border level. Nationally, uninsured adult non-Hispanics were more likely to report inability to afford mental health services than were uninsured Hispanics (6.6 percent

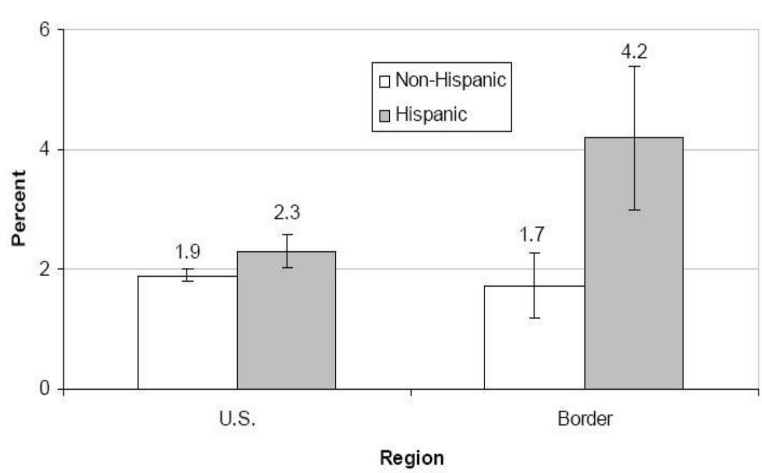

***Figure 10*: Percent of the adult population who could not afford mental health services for the previous 12 months, by ethnicity, 2000-2003**
(Results are based on answers to the following question: "During the past 12 months, was there any time when you needed mental health counseling but did not get it because you could not afford it?")

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

versus 4.2 percent). Although uninsured Hispanics in the border region reported the highest percentage of all (7.7 percent), the ethnic disparity for uninsured Hispanics versus non-Hispanics at the border was not statistically significant[8].

II: Use of Health Services

Analysis of use of health services provides a general picture of whether the adult population was able to access the types of health services generally sought when an injury or illness occurs. Public health literature suggests that the use of health services is heavily influenced by socio-demographic factors such as cost, location, health insurance coverage, and ethnicity (Lieu, Newacheck, & McManus, 1993; Macias & Morales, 2001; Valdez et al. 1993). All of these factors come into play as well for people who reside along the U.S.-Mexico border. However, health insurance status and ethnicity were consistently two of the most important measurable influences on the use of health services in this region.

This section provides an overview of the effect of health insurance status and ethnicity on the use of selected health services in the border region. It is divided into three topics: access to health services, accessibility to health professionals, and immunization practices.

Access to Health Services

Having a place to go when you are sick

In 2000-2003, almost one of every five adults living near the border did not have adequate access to health care when they were sick or needed medical advice. The percent of the border population without a place to go when they were sick (18.6 percent) was 36 percent higher than the national estimate (13.6 percent).

Having no place to go to receive health services was related to ethnicity. Hispanics who lived in the border area were more than three times more likely than non-Hispanics living in the same region not to have a place to go (31.9 percent versus 10.0 percent). In addition, Hispanics who lived at the border were more likely than the average U.S. Hispanic not to have access to health care when they were ill (31.9 percent versus 28.4 percent). In both regions (national and border), the disparity between Hispanic and non-Hispanic adults was statistically significant (see **Table 6**).

8 The border point estimates for insured Hispanics and insured non-Hispanics are unreliable. Reported relative standard errors (RSE) are higher than 30.

Having a place to go when sick was heavily influenced by both ethnicity and health insurance status, as **Figure 11** shows. Approximately 11 percent of insured adult Hispanics who lived near the border indicated that they usually did not have access to health care when they were sick or needed advice about health issues. Although this percentage was comparatively low, ethnicity as a factor, no matter the health insurance status. Among the insured population in the border region, Hispanics were more likely than non-Hispanics not to have a place to go when they needed medical care (11.2 percent versus 4.8 percent). This disparity was consistent with national data, which show insured Hispanics were more likely than insured non-Hispanics not to have a place to go when they were sick (10.6 percent versus 7.5 percent).

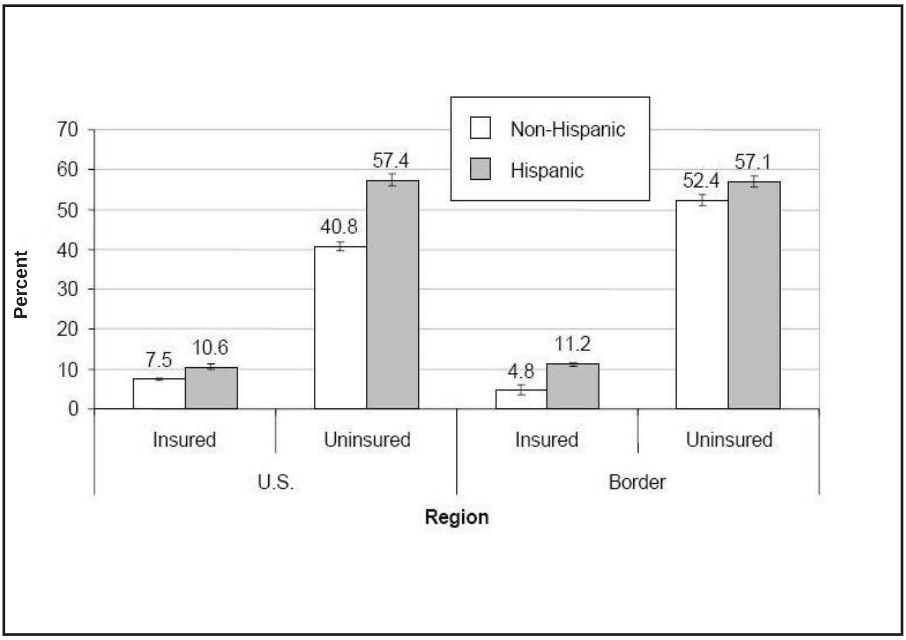

***Figure 11*: Percent of the adult population who do not have a usual place to go when they are sick, by ethnicity and insurance status, 2000-2003**

(Results are based on answers to the following question: "Is there any place that you usually go to when you are sick or need advice about your health?")

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

Among the uninsured U.S. adult population, more than half of Hispanics (57.4 percent) did not have a place to go to access health services when they were sick, compared to 40.8 percent of the non-Hispanic population. In the border region, more than half of the uninsured adult population did not have a place to go when they were sick, regardless of ethnicity (Hispanics 57.1 percent, non-Hispanics 52.4 percent). The percentage of uninsured Hispanics in the border region without a place to go for medical care was 9 percent higher than that of uninsured non-Hispanics in the same area. However, due to limited sample size, there was insufficient evidence to demonstrate a statistically significant difference.

A noticeable gap between ethnic groups that differed in health insurance status is visible. Hispanics who lived in the border region and did not have health insurance were more likely not to have a place to go when sick than were insured Hispanics living in the same region (57.1 percent versus 11.2 percent). Both nationally and in the border region, considerable disparity was observed in having a place to go when sick based on insurance status and ethnicity.

Where do people go to receive health-care services?

Identification of places where people received health-care services provides a general picture of health services utilization. In 2000-2003, 79.7 percent of U.S. adults had visited a doctor's office or health management organization (HMO) facility. Approximately one out of every five individuals had used clinics, health centers, emergency rooms, or outpatient services. In general, point estimates between the United States and the border were roughly equivalent (see **Table** 7).

Non-Hispanics were more likely than Hispanics to use doctors' offices or HMO services. On the other hand, Hispanics were more likely than non-Hispanics to use other health services to address their health needs, as shown in **Figure 12**. Hispanic adults were more likely to report the use of emergency room or outpatient facilities

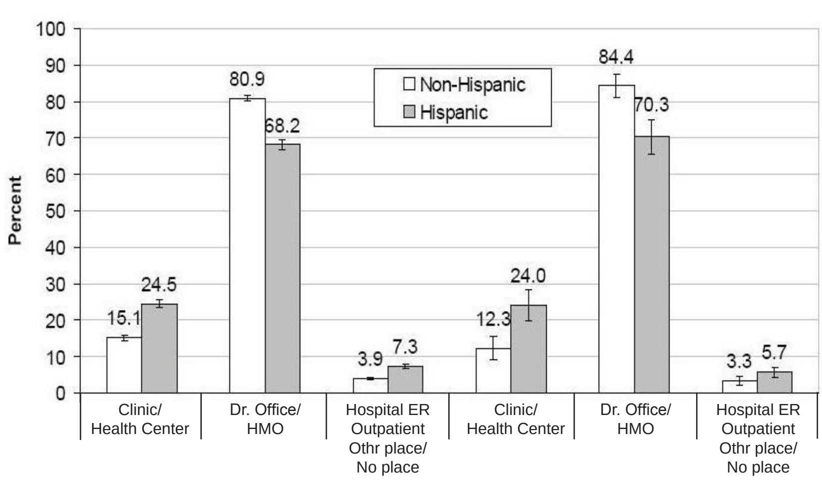

***Figure 12*: Percent and places that the adult population reported having gone when they were sick or needed advice about their own health, by ethnicity**

(Results are based on answers to the following question: "Is there any place that you usually go to when you are sick or need advice about your health?")

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

than were non-Hispanics (7.3 percent versus 3.9 percent). This national trend was similar at the border, where Hispanics were more likely than non-Hispanics to use outpatient facilities (5.7 percent versus 3.3 percent).

Selection of places to receive health care was deeply influenced by both ethnicity and health insurance status. Even among the insured population, noteworthy differences were observed. The average U.S. adult Hispanic was less likely to frequent doctors' offices and HMOs than the average U.S. adult non-Hispanic (77.0 percent versus 83.0 percent). On the other hand, Hispanics with health insurance were substantially more likely to visit doctors' offices or HMOs than were Hispanics who did not have health insurance (77.0 percent versus 37.7 percent).

At the border, Hispanics who did not have health insurance were less likely to visit doctor's offices or HMO facilities than were Hispanics who had health insurance (46.2 percent versus 79.8 percent). Both nationally and in the border region, the disparity between insured and uninsured adult Hispanics was notable. Our results paralleled Cohen's findings: Both nationally and at the border, the adult population with no health insurance displayed the highest percent of emergency room use compared to their insured counterparts (Cohen 2005). At the border, use of emergency room or outpatient facilities was four times greater among Hispanics who did not have health insurance than among Hispanics who had health insurance (12.9 percent versus 2.9 percent). The disparity was slightly less at the national level, where the percentage of uninsured Hispanics who used emergency room services was not quite four times greater than that of the insured Hispanic population (17.2 percent versus 4.5 percent).

Emergency room use

Emergency rooms are widely conceived as gateways to medical services for those who have an illness or injury that cannot wait for a regular doctor's visit, specifically if the problem is life-threatening. But some literature suggests that emergency room use is noticeably changing. An increasing proportion of emergency room visits are for conditions more appropriately cared for in primary care than urgent care settings. Researchers at the Seton Healthcare Network in Texas[9] note that current emergency room use in that state is due to two main sources: a) the increasing number of uninsured individuals and b) a growing number of insured individuals whose health problems are less pressing but who believe that they need urgent medical attention (Care for All, 2002).

Misuse of emergency rooms creates three main problems for health systems as well as for the frequent emergency room user. First, the emergency room is not a satisfactory environment for treating routine health problems. Emergency

9 The Seton Healthcare Network is considered the leading provider of health-care services in Central Texas. More information about the network is available at www.seton.net.

room protocols generally do not allow for continuum of care once the individual is discharged. Second, the extra demands made on emergency room services by people with non-emergent conditions force emergency rooms to provide limited or low-quality health services to others who do need care for emergent conditions (Care for All, 2002). Third, treatment of minor ailments in the emergency room setting is documented to be significantly more expensive than the use of other health-care options, such as a visit or telephone consultation with a primary care provider.

Of the population that reported emergency room use during the previous year, the border adult population was less likely to use emergency room services than were adult populations in any other region under study (see Table 8). Emergency room services were used by 14.7 percent of adults living in the border region. This was 27 percent less than the estimate for the four border states combined (17.8 percent) and 20 percent less than for the non-border region (18.4 percent).

Ethnicity also affected the likelihood that a person had used emergency room services in the previous year. Nationwide, the average adult Hispanic was nearly 14 percent less likely to report the use of emergency room services than was the average adult non-Hispanic (17.5 percent versus 20.4 percent). This difference was reflected in all the regions under study, although in some instances differences were not statistically significant (see **Table 8**). At the border, emergency room utilization was similar for Hispanics and non-Hispanics (13.1 percent versus 15.7 percent).

Adult Hispanics in the border region were about one-quarter less likely to use emergency room services than were Hispanics nationwide, a statistically significant difference. This finding may be explained, at least in part, by the proximity of less costly health-care services in Mexico. In their 2001 study of health-care utilization in the border region, Macias and Morales (2001) found that many Hispanics were willing to travel to Mexico to find health services despite the significant burden of cost and travel. The authors reported that U.S. residents living in the border region often sought care in Mexico because health services cost much less there than in the United States, and because they could receive health services in their native language.

Health insurance status was an important determinant of emergency room utilization, as shown in **Figure 13**. In general, adults who had health insurance were more likely to report using emergency room services in the previous year than were those who did not have health insurance. In both the border region and the United States as a whole, point estimates for emergency room use were equivalent for the insured population. This finding suggests that having health insurance makes the cost of emergency room services affordable, regardless of ethnicity. However, the difference in emergency room use between adult Hispanics and non-Hispanics who did not have health insurance was striking. Hispanics in the border region who did not have health insurance were less likely to report emergency room use than were Hispanics in the same region who did have health insurance (9.4 percent versus 16.0 percent). Nationally, uninsured Hispanics were 40 percent less likely to use emergency room services than were uninsured non-Hispanics (13.1 percent versus 22.0 percent).

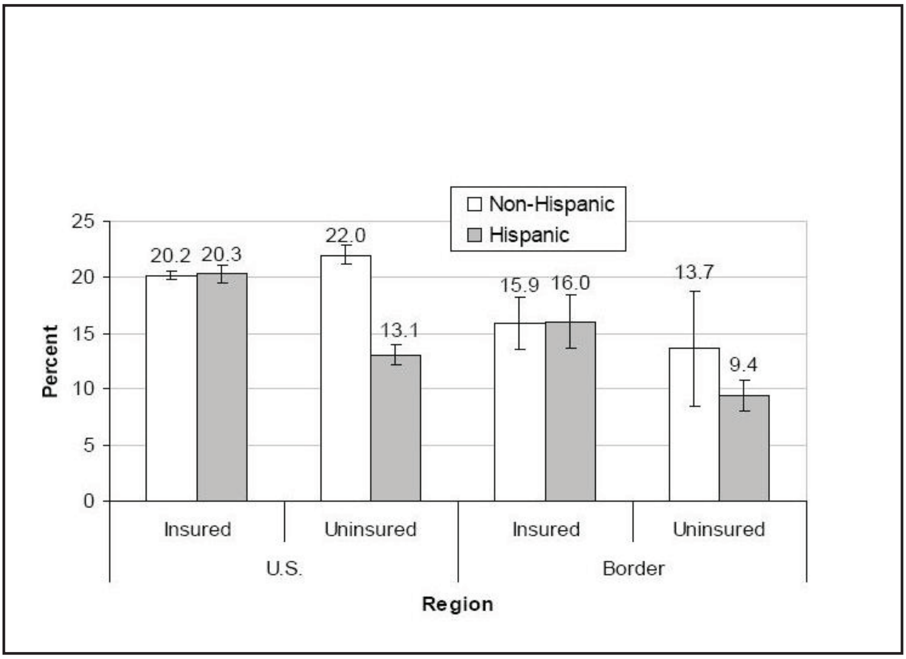

***Figure 13*: Percent of the adult population who had used emergency room services during the previous 12 months, by ethnicity and insurance status, 2000-2003**

(Results are based on answers to the following question: "During the past 12 months, how many times have you gone to a hospital emergency room about your own health?" This includes emergency room visits that resulted in hospital admissions.)

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

Results shown in Figure 13 are based on answers to the following question: "During the past 12 months, how many times have you gone to a hospital emergency room about your own health?" This includes emergency room visits that resulted in hospital admissions. This question referred specifically to the frequency of emergency room use in a year period. It differs substantially from the question about home sites that are sought for health services, which measures the frequency of medical homes – i.e., a single place where care is coordinated. Thus, the questions are not compatible in concept and scope.

Overnight hospital stay

Reported overnight hospital stay is a way to measure the potential effect of cost on the ability of populations to use inpatient health care services. For the purpose of this section, “overnight hospital stay” is defined as the affirmation by the survey respondent of at least one overnight stay in an inpatient hospital facility. Due to the wording of the NHIS survey question, overnight hospital stay reflects the estimate for the total population instead of the adult population. In 2000-2003, the total population of the border was less likely to spend a night in a hospital than the population of the United States as a whole (7.9 percent versus 8.5 percent). Border residents were 7 percent less likely to stay overnight in a hospital than were people in the United States as a whole (see **Table 9**).

Evidence of ethnic disparity concerning an overnight hospital stay was found exclusively at the national level, where Hispanics were less likely than non-Hispanics to spend at least one night in a hospital setting (7.4 percent versus 8.7 percent). At the border (Table 9), the difference in overnight hospital stay between Hispanics and non-Hispanics was not statistically significant (7.6 percent versus 8.2 percent).

A notable discrepancy in overnight hospital stay was found among populations who differed by health insurance status. In all regions, people with health insurance were more likely to stay overnight in a hospital than were those without health insurance as indicated in **Figure 14** and Table 9. In the border region, Hispanics who had health insurance were more than twice as likely to spend a night in a hospital as were those who did not have health insurance (9.5 percent versus 4.5 percent). A similar trend was seen in the border non-Hispanic population. The proportion of non-Hispanics who resided in the border region, had health insurance, and who reported at least an overnight hospital stay was more than twice the proportion of uninsured non-Hispanics (8.8 percent versus 4.0 percent). At the border, there was no difference by ethnicity among those who shared the same insurance status. This evidence suggests that health insurance plays an important role in determining whether a person is able to afford an overnight hospital stay when needed.

Accessibility to Health Professionals

Contact with health professionals, either through a face-to-face visit or by telephone consultation, is a conventional way to deal with an ailment outside the hospital inpatient setting. In this fashion, as opposed to an inpatient hospital facility, the individual who suffers from a condition can receive follow-up services over a long interval of time. The following section summarizes findings regarding the accessibility of the population to a selected group of health professionals.

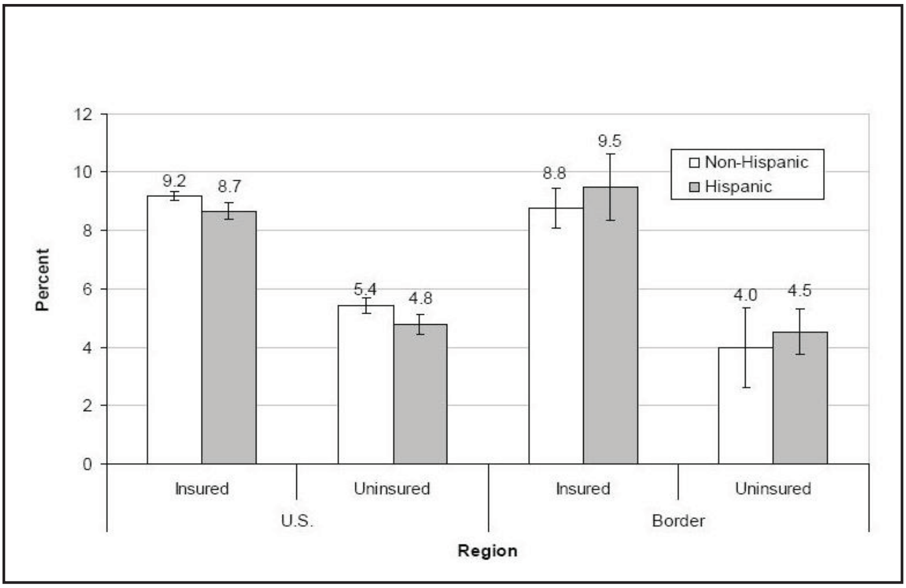

Figure 14**: Percent of the total population who spent at least one night in a hospital, by ethnicity and insurance status**

(Results are based on answers to the following question: “During the past 12 months, was [name of individual] a patient in a hospital overnight?” Overnight stays in an emergency room were not included. However, overnight stays for mothers and neonates were included.)

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

See or talk to a general doctor in the previous 12 months

For the purposes of this section, contact with a general doctor was defined as getting in contact with a health professional who specializes in treating a variety of illnesses during the previous year[10]. Both face-to-face and telephone contacts were counted. In 2000-2003, the adult population at the border was less likely than the average United States resident to have seen or talked to a general doctor in the previous year (56.7 percent versus 68.2 percent). Residents of the border region were less likely to get in touch with a general doctor than were residents of any other region (see **Table 10**).

There was demonstrable ethnic inequality in contact with a general doctor in all regions. Generally, adult Hispanics were less likely to have contact with a general doctor than were non-Hispanics. This trend was heightened at the border, where the percentage of Hispanics who had seen or talked to a doctor during the previous year (45.2 percent) was 30 percent less than that reported by the non-Hispanic population (64.2 percent) and 20 percent less than the percentage reported for the whole border population (56.7 percent).

10 Based on previous work done by Robin Cohen and others (2004), a time frame of a year is used as a gold standard to quantify the affirmation and frequency of contact with health professionals. For comparison purposes, the following sections contain estimates of contacts with selected health professionals based on the same interval of time.

Health insurance plays a pivotal role in determining ability to see or talk to a general doctor. In the border region, Hispanics and non-Hispanics who had health insurance were more likely to have had contact with a general doctor than were their uninsured counterparts (57.1 percent and 68.2 percent, respectively, versus 30.4 percent and 32.2 percent, respectively). But an ethnic gap was seen even for those with health insurance, as shown in **Figure 15**. At the border, insured adult Hispanics were less likely to see or talk to a doctor than were insured non-Hispanics living in the same region. The point estimate for insured Hispanics in the border region was more than 15 percent less than for the non-Hispanic population.

Not having health insurance severely limits access to health care professionals. This limitation was noticeable at the border where the estimates for uninsured adult Hispanics and non-Hispanics were equivalent. Nationally, the average uninsured Hispanic was less likely than the average uninsured non-Hispanic to have had contact with a general doctor during the previous year (34.5 percent versus 45.3 percent).

See or talk to a medical specialist doctor during the previous 12 months

The adult border population also faced obstacles in accessing care from specialized health professionals. In comparison with all people in the United States, people living in the border region were less likely to have seen or talked to a medical specialist during the previous year (19.9 percent versus 25.7 percent; see **Table 11**).

Analysis of ethnic differences shows that Hispanics in general were less likely to have seen or talked to a medical specialist during the previous year than were non-Hispanics. Hispanics living in the border region were notably less likely to report contact with a medical specialist than were non-Hispanics in the same region (11.7 percent versus 25.2 percent). Hispanics living in the border region were also less likely to see or talk to a specialist than were Hispanics in the United States as a whole (11.7 percent versus 15.1 percent).

Limits in access to a medical specialist were linked directly to having health insurance, as well as to ethnicity. At the border, Hispanic adults who did not have health insurance were less likely to have seen or talked to a specialist than were uninsured non-Hispanics (5.0 percent versus 11.9 percent). But ethnic disparity was also evident, even among those without health insurance. As **Figure 16** illustrates, Hispanics who lived in the border region and had health insurance were still less likely to have had contact with a medical specialist than were insured non-Hispanics in the same region (17.2 percent versus 26.7 percent). This finding was replicated both nationally and throughout the southwest area. In all regions, statistically significant differences were easily identified.

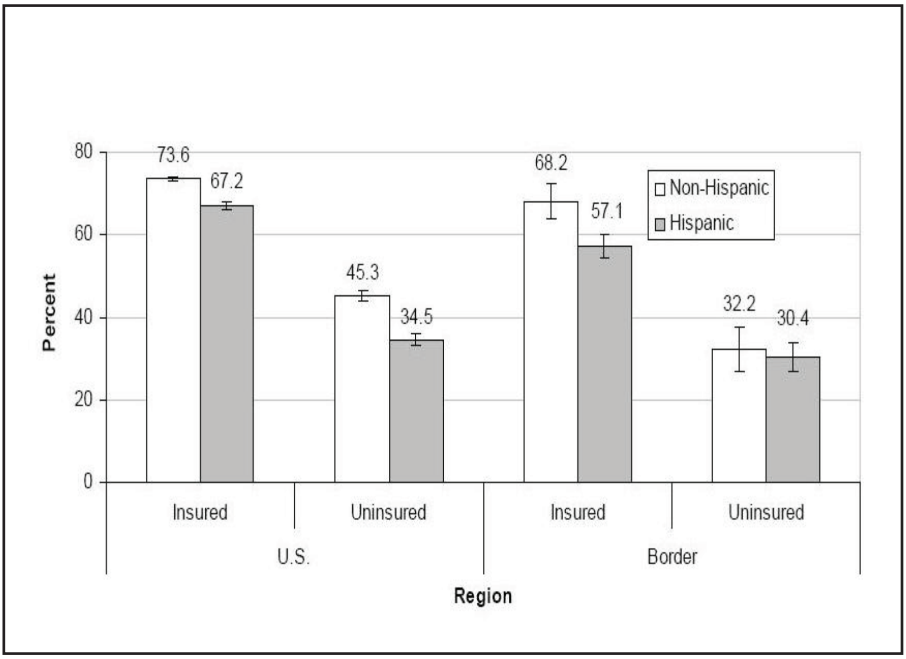

***Figure 15*: Percent of the adult population who had seen or talked to a general doctor during the previous 12 months, by ethnicity and insurance status**

(Results are based on answers to the following question: "During the past 12 months, have you seen or talked to any of the following health care providers about your own health? A general doctor who treats a variety of illnesses (a doctor in general practice, family medicine, or internal medicine).")

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

See or talk to an obstetrician/gynecologist during the previous 12 months

Regular visits to an obstetrician and gynecologist (OB/GYN) are of critical importance during pregnancies and deliveries. In addition, OB/GYNs can help the female population avoid or prevent health complications from happening, identify internal biological abnormalities at an early stage, and help to control them. Preventive health measures provided by OB/GYNs include breast exams, pelvic exams, and Pap tests. Many physicians consider OB/GYN visits to be the ideal forum for discussion of sexual health practices such as birth control and prevention of sexually transmitted infections and diseases. Experts in the women's health field strongly suggest that annual visits to an OB/GYN begin as early as age 13 as a means to initiate successful preventive health measures (American College of Obstetricians and Gynecologists [ACOG]).

Data presented here are limited to the female population 18 years and older. Analysis shows that the overall adult female population along the border reported limited access to OB/GYN care in comparison to the rest of the United States. Adult women who resided in the border area were less likely to report visits to an

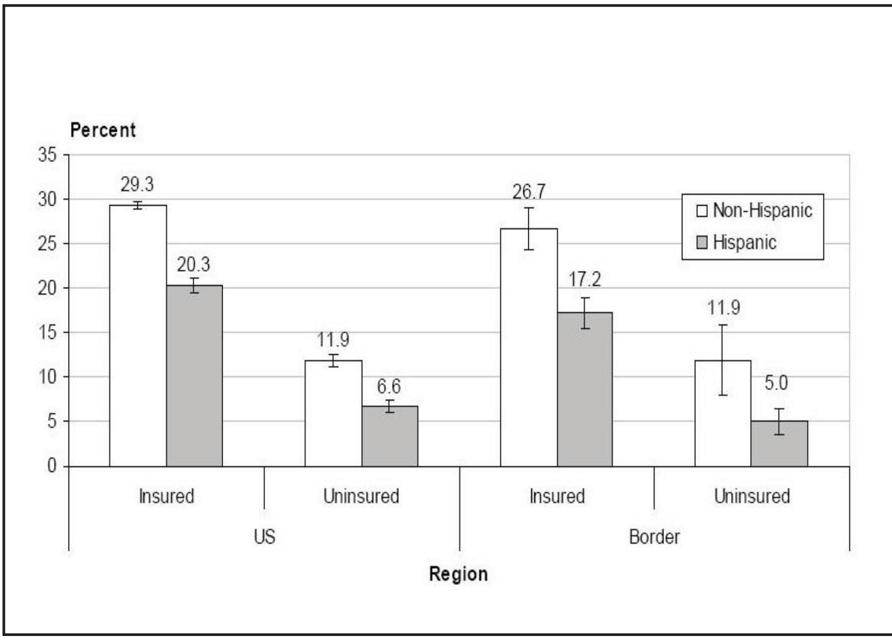

***Figure 16*: Percent of the adult population who had seen or talked with a medical specialist during the previous 12 months, by ethnicity and insurance status**

(Results based on answers to the following question: "During the past 12 months, have you seen or talked to any of the following health-care providers about your own health? A doctor who specializes in particular medical disease.")

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

OB/GYN than any other female group (see **Table 12**). Female adults living in the border region were almost 11 percent less likely to have visited an OB/GYN during the previous year than were women nationwide (40.8 percent versus 45.6 percent). For Hispanic women in the border area, the joint effect of ethnicity and region of residence was to decrease the likelihood that they reported contact with an OB/GYN during the previous year. At the border, the percentage of adult Hispanic females who had visited an OB/GYN was more than 20 percent less than non-Hispanic females (35.1 percent versus 44.5 percent).

Health insurance status had considerable influence over women's ability to access OB/GYN services, as illustrated in **Figure 17**. Nationally, Hispanic women who had health insurance were more likely to have visited an OB/GYN than were insured non-Hispanic women (50.1 percent versus 47.3 percent). In every region under study, Hispanic women who had health insurance reported equal or higher use of OB/GYN services than did their insured non-Hispanic counterparts. In the border area, Hispanic women who did not have health insurance were dramatically less likely to report access to an OB/GYN than were insured Hispanic women in the same region (27.5 percent versus 40.7 percent). Uninsured Hispanic females living in the border region were least likely to report having seen or talked to an OB/GYN during the previous year. However, their level of access to OB/GYN care was not significantly different from that of uninsured Hispanic females throughout the southwest.

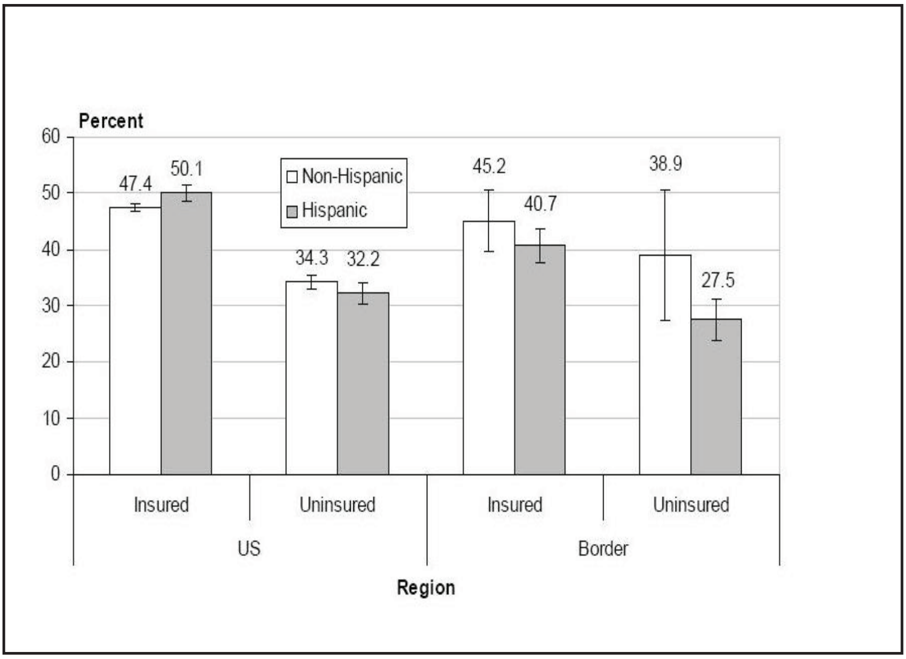

***Figure 17*: Percent of the adult female population who had seen or talked with an obstetrician/gynecologist during the previous 12 months, by ethnicity and insurance status**

(Results are based on answers to the following question: "During the past 12 months, have you seen or talked to any of the following health-care providers about your own health? A doctor who specializes in women's health (an obstetrician/gynecologist).")

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

Access to Oral Health Care

Oral health is traditionally maintained by regular visits to the dentist (at least two per year) and practice of good oral hygiene. This analysis was limited to the portion of the adult population 18 and older who reported not having seen a dentist for more than a year. Estimates for those who visited a dentist more frequently can be found in **Table 13**, which contains estimates based on answers[11].

Geographic region was an important determinant of access to oral health care. People in the border region were more likely than the average United States resident not to have seen or had any contact with a dentist for more than a year (39.8 percent versus 36.2 percent).

11 Table 13 contains estimates based on answers to the question: "When was the last time you visited a dentist?" Six months or less, more than six months, but not more than a year, and more than a year.

Analysis of data on ethnicity and use of oral health care services showed that adult Hispanics were substantially less likely than non-Hispanics to have had any contact with a dentist in more than a year. In the border region, the proportion of Hispanics who had not seen or talked to a dentist was greater than that reported by the non-Hispanic community (56.2 percent versus 29.8 percent). This pattern was replicated nationally; across the United States, Hispanics were more likely to report lack of access to oral health services than were non-Hispanics (48.6 percent versus 34.7 percent). In comparison with other regions, Hispanics who lived in the border area were also more likely than any other Hispanic or non-Hispanic group to have not seen or talked to a dentist in more than a year.

Regardless of ethnicity status, access to oral health services was also greatly influenced by health insurance status. In 2000-2003, adult Hispanics who lived in the border area and did not have health insurance were more likely to report not having seen or talked to a dentist for more than a year. Of this population, 71 percent reported no contact with a dentist for 12 months or more. Similarly, 65 percent of uninsured non-Hispanics who lived in the border region reported lack of access to oral health services for more than a year.

When oral health care use was compared between equivalent ethnic groups with different health insurance status, a striking disparity emerged. The percent of uninsured Hispanics in the border region who had not seen a dentist for more than a year was 57 percent greater than that of insured Hispanics in the same region (70.8 percent versus 45.1 percent). A similar trend was found across the United States. Nationwide, uninsured Hispanics were more likely than insured Hispanics to have not seen or talked with a dentist for more than a year (65.8 percent versus 39.0 percent).

Ethnic disparities were also found even among groups of equivalent insurance status, as shown in **Figure 18**. Of the insured population, Hispanics who lived in the border area were more likely than non-Hispanics to be unable to access oral health services (45.1 percent versus 25.5 percent). This tendency was reflected nationally, where insured Hispanics were more likely to report inability to access oral health services than were insured non-Hispanics (39.0 percent versus 31.1 percent).

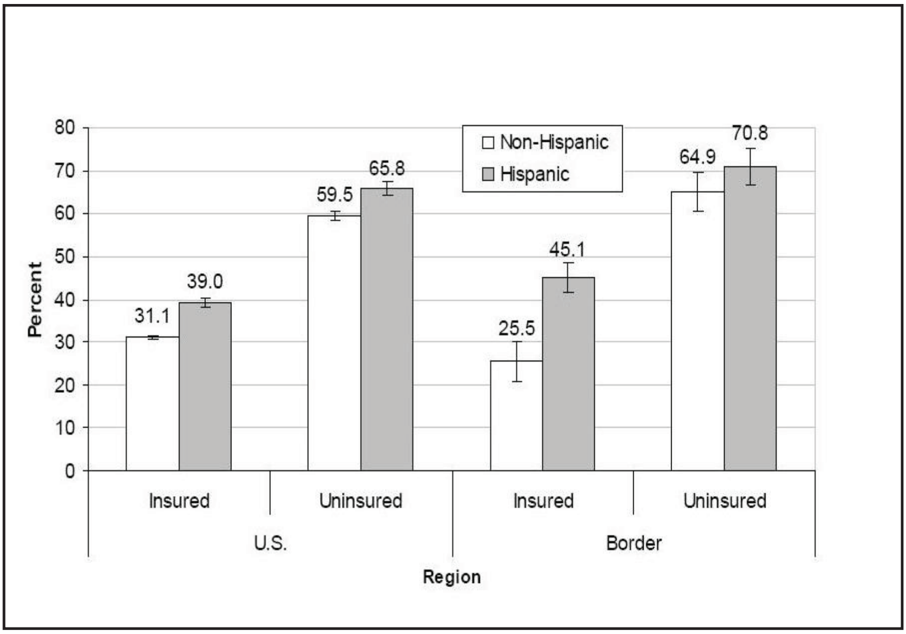

***Figure 18*: Percent of the adult population who had not seen or talked to a dentist in more than a year**

(Results are based on answers to the following question: "About how long has it been since you last saw a dentist? Include all types of dentists, such as orthodontists, oral surgeons, and all other dental specialists as well as dental hygienists.")

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

Access to Mental Health Services

Access to mental health services is essential for treatment of mental disorders such as anxiety, depression, substance abuse, suicide, and other behavioral or psychological conditions. Consulting with a mental health professional is the most effective way to identify behavioral health disorders, provide preventive and therapeutic psychological services, and avoid inpatient hospitalizations for mental disorders.

Strong evidence suggests that the proportion of mental disorders and alcohol abuse is similar among Hispanics and non-Hispanics (U.S. Department of Health and Human Services [HHS], 1999, 2000, 2002). Nationally, the number of bilingual mental health professionals who serve Spanish-speaking clients is inadequate to serve the growing Hispanic population. The 1990 Surgeon General's mental health report documented only 29 Hispanic mental health professionals for every 100,000 Hispanics, compared to 173 non-Hispanic providers per 100,000 U.S. residents. This health care workforce shortage is amplified in the border region, where Spanish speakers are common and inadequate access to mental health services continues to be observed.

In 2000-2003, adults in the border area reported that they were less likely to have sought mental health services during the previous year than the average person in the United States (4.7 percent versus 6.2 percent). A similar difference was found for the southwest region versus the United States, as documented in **Table 14**. Overall, Hispanics were less likely to have seen or talked to a mental health professional than were non-Hispanics. **Figure 19** shows the difference by ethnicity for both the border area and nation. Nationally, the proportion of Hispanics who sought mental health services during the previous year was 41 percent lower than that of non-Hispanics (3.8 percent versus 6.5 percent). In the border region, the percentage of Hispanic adults who sought mental health services during the previous year was less than half that of non-Hispanic (2.7 percent versus 6.0 percent). Evidence of ethnic disparity in seeking mental health services was reflected in other regions as well (see Table 14).

As in access to all other types of health care, insurance and ethnicity played important roles in determining access to mental health services across the United States. Nationwide, uninsured Hispanics were less likely to seek mental health services than were insured Hispanics (1.4 percent versus 5.3 percent). But even those Hispanics with health insurance experienced disparity in access to mental health services. Among the insured population of the United States, Hispanics were less likely than non-Hispanics to seek mental health services (5.3 percent versus 6.5 percent). However, in the border region, differences in access to mental health care services by ethnicity and insurance were not statistically significant[12].

Immunization

Immunizations for influenza (flu) and pneumonia are available for both adults and children and historically have dramatically reduced the impact of these diseases in the United States. Yet the impact of these diseases is still enormous. According to the CDC, influenza causes illness in 5 to 20 percent of the population each year, more than 200,000 hospitalizations, and about 36,000 deaths. Influenza is also closely related to pneumonia, a bacterial infection of the lungs. Lungs weakened by the flu virus are especially susceptible to infection. In 2002, pneumonia accounted for 64,954 deaths in the United States. Combined, flu and pneumonia would rank as the seventh leading cause of death in the United States (Anderson, 2005). According to estimates from the National Heart Lung and Blood Institute (2004), the cost for dealing with both diseases is about $37.7 billion per year. Of this sum, $31.9 billion (84.6 percent) is attributable to direct costs, while $5.8 billion (15.4 percent) is due to indirect mortality.

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12 The percentage of uninsured Hispanic population is unreliable. RSE <30.

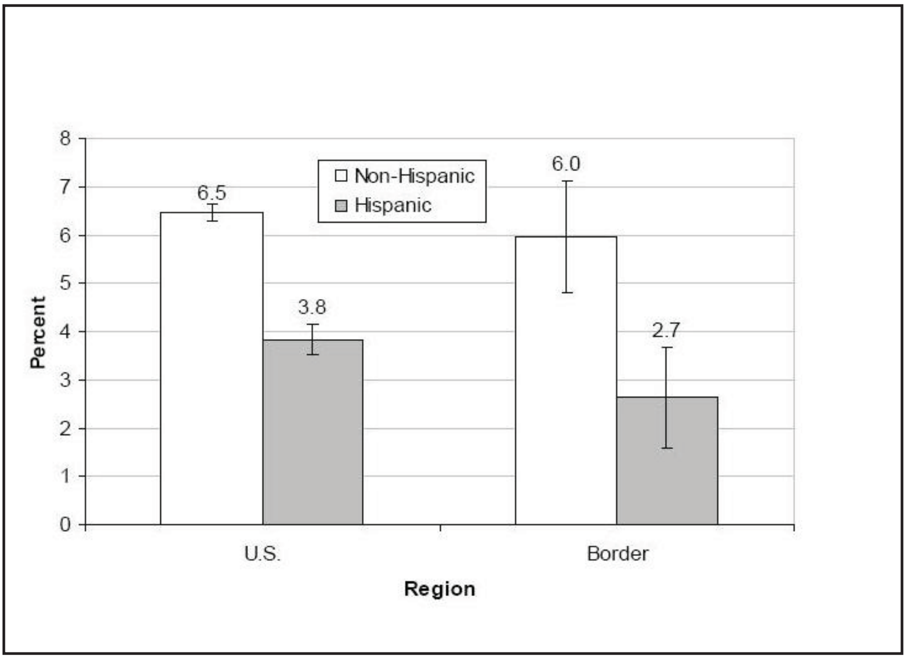

***Figure 19*: Percent of the adult population who had not seen or talked to a mental health professional during the previous 12 months, by ethnicity**

(Results are based on answers to the following question: "During the past 12 months, have you seen or talked to any of the following health-care providers about your own health? A mental health professional such as a psychiatrist, psychologist, psychiatric nurse, or clinical social worker.")

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

Analysis of influenza and pneumonia immunization rates among adults reveals disparities based on geographic region, ethnicity, and health insurance status. Such analysis can help identify possible causes of low immunization rates.

Influenza

The CDC recommends seasonal flu vaccine for anyone who wishes to avoid the flu, but especially for young children, pregnant women, persons aged 50 and older, people with chronic diseases, those living in nursing homes or chronic care facilities, and people who are likely to be exposed to the flu such as health-care workers. Flu vaccination must be repeated yearly to provide protection because the virus changes rapidly.

For immunization practices to be successful, a strong and continuous vaccination campaign has to be carried out. Unfortunately, this practice is not consistent across the United States. Comparison of flu immunization practices between the border and the United States as a whole shows disparities in access to and use of the vaccine (see **Table 15**). In 2000-2003, adults living in the border region were less likely to report having received flu vaccination during the past year than were people in the United States as a whole (24.2 percent versus 27.9 percent).

Ethnicity strongly affected the likelihood that a person had received flu vaccination. Hispanics were less likely to receive flu vaccination than were non-Hispanics, no matter where they lived. In the border region, 16.5 percent of adult Hispanics reported having received flu vaccination, compared to 29.2 percent of non-Hispanics, a ratio of almost one to two. Nationally, 40 percent fewer Hispanics than non-Hispanics received a flu shot (17.4 percent versus 29.2 percent). In contrast, there was no difference in immunization rates between non-Hispanics living in the border region and non-Hispanics nationwide.

Health insurance status also had a tremendous impact on the likelihood of receiving flu vaccination, as illustrated in **Figure 20**. In 2000-2003, people who had health insurance were more likely to report having received flu vaccination, no matter what their ethnic group or geographic region, than were those without health insurance. In the border region, uninsured Hispanics were

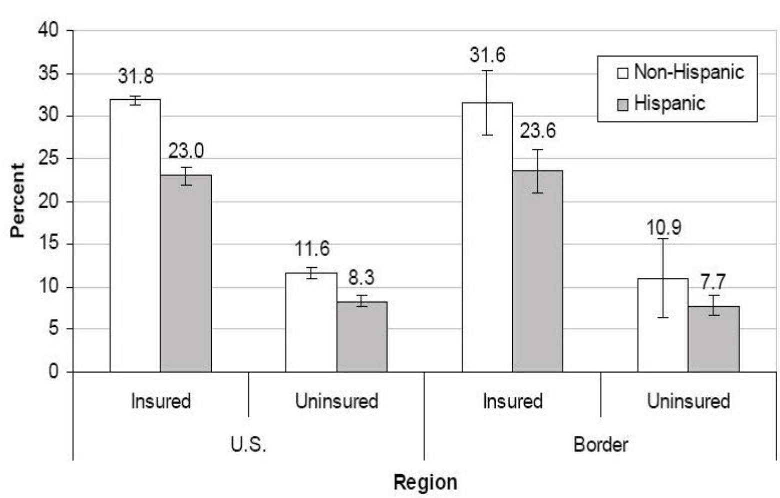

***Figure 20*: Percent of the adult population who had received a flu shot in the previous 12 months, by ethnicity and insurance status, 2000-2003**

(Results are based on answers to the following question: "During the past 12 months, have you had a flu shot or flu vaccine sprayed in your nose by a doctor or any other health professional? A health professional may have let you spray it. This vaccine is usually given in the fall and protects against influenza in the flu season.")

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

notably less likely to have received flu vaccination than were insured Hispanics (7.7 percent versus 23.6 percent). Nationally, insured Hispanics were 28 percent less likely to receive a flu shot than were insured Non-Hispanics (23.0 percent versus 31.8 percent).

Although health insurance was the major determinant of flu immunization rates, ethnicity was also an important factor. Among those insured, Hispanics were less likely to report flu immunization. This ethnic disparity was more pronounced in the border region, where 25 percent fewer insured Hispanics than insured non-Hispanics received flu vaccination (23.6 percent versus 31.6 percent).

Pneumonia

The CDC recommends a single pneumonia vaccination for people who are older than 65 years of age, chronically ill, and other vulnerable populations. Yet the immunization rate for pneumonia is low across the United States, even among these targeted populations. In 2000-2003, only 15.6 percent of the United States adult population reported having received a pneumonia shot. The estimated percentage at the border was 14.9 percent, not significantly different from the national rate. Pneumonia immunization was slightly higher in the border area than in the southwest region as a whole. **Table 16** documents these differences.

In the border region, ethnicity strongly impacted the likelihood of receiving pneumonia vaccination. Only 6.2 percent of Hispanics reported immunization against pneumonia, compared to 20.6 percent of non-Hispanics. Nor was ethnic disparity exclusive to the border region. Inequality in pneumonia immunization based on ethnicity was reported in all other regions (see Table 16).

Health insurance status was a less important predictor of pneumonia immunization than was ethnicity. Non-Hispanics with health insurance were more likely to have ever received pneumonia vaccination than were Hispanics with health insurance. Among people who had health insurance in the border region, the percentage of Hispanics who had ever received pneumonia immunization was 60 percent less than the estimate for non-Hispanics (9.1 percent versus 22.6 percent). A similar disparity was found at the national level, where the percentage of insured Hispanics who had received the vaccine was 48 percent lower than that of insured non-Hispanics (18.2 percent versus 9.4 percent). Among uninsured populations, non-Hispanics reported higher pneumonia immunization rates than did Hispanics.

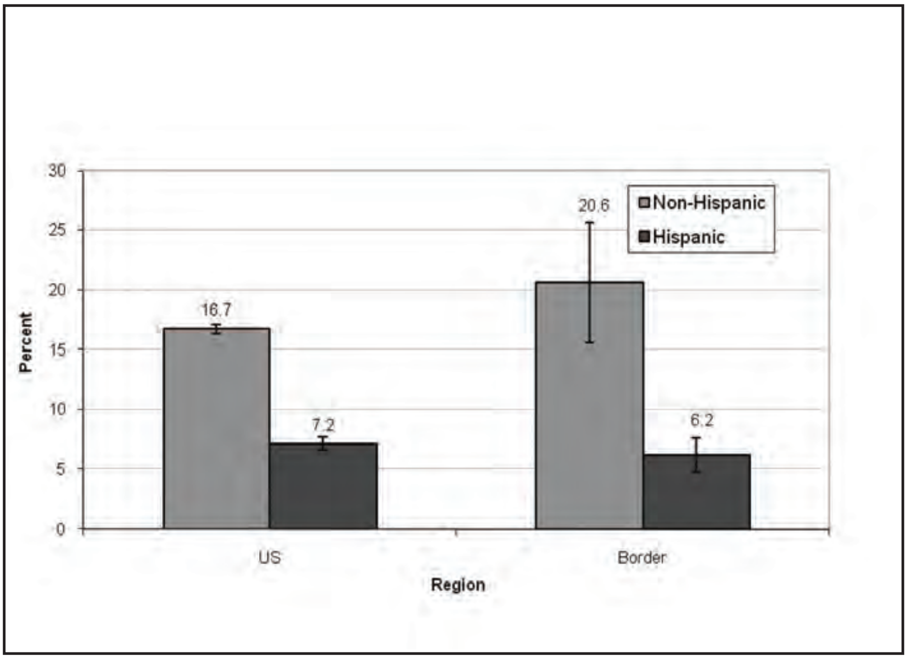

***Figure 21*: Percent of the adult population who had ever received a pneumonia shot, by ethnicity, 2000-2003**

(Results are based on answers to the following question: "Have you ever had a pneumonia vaccination, sometimes called a pneumonia shot? This shot is usually given only once in a person's lifetime and is different from the flu shot.")

Data retrieved in 2005 from the 2000-2003 NHIS in-house data file

III. Conclusion and Recommendations

This chapter provides a comprehensive description of access to health care and health care consumption along the U.S.-Mexico border, as well as comparisons to the nation as a whole and to other relevant geographic regions. The results demonstrate that insurance status and ethnicity are important determinants of a person's ability to access health care services.

In comparison to the United States, the population living in the border region was more likely to report significant inability to access and afford health care, including having contact with a primary care physician, medical specialist, dentist, or mental health professional. People who lived in the border area were also less likely to report compliance with standard immunization practice. They were more likely to be uninsured and to spend more than a year without having any kind of health insurance coverage.

Analysis of these data consistently shows ethnic disparity in access to health care between Hispanic and non-Hispanic adults. In most areas examined, this disparity was found even among the insured population. However, people who had insurance were more prone to report adequate access to health care than those who did not. This tendency was seen at the border, but also at the state, regional, and national levels. Most literature that examines access to health care uses health insurance coverage as the main measure of access. But data from this report show that even with insurance, a noteworthy disparity in access to health services is related to ethnicity. Our work suggests that, compared to uninsured non-Hispanics living in the border region, uninsured Hispanics are (a) less likely to access direct medical care through a doctor's visit or specialist; (b) often do not have a place to go when they are sick or need health advice; (c) do not seek specialty medical care; (d) do not have an adequate immunization practice, and (e) are more likely to report inability to afford extended inpatient care.

These findings provide a comprehensive picture of the limits on access to health care in the border region, especially for the portion of the population that is currently uninsured. Future work on this topic should go beyond the mere quantification of health-care accessibility and health insurance status. For future research, we suggest the application of a novel and integrated approach to measure access to health care, based on different health insurance coverage types. This exercise would deepen comprehension of how the use and consumption of health care services by the border population can be better described and consequently improved.

The findings of this report suggest that two areas need to be addressed in order to improve access to health care in the U.S.-Mexico border. First, health care providers must be given the necessary infrastructure and resources to provide affordable, high-quality health care services to those who currently cannot afford care. Second, the general population must be provided with the resources and information they need to effectively access health care at all levels. Public health professionals have the responsibility to be the liaison between these two worlds. Public health professionals, health care providers, and government need to work together to ensure that these two issues are addressed. Without this collaboration, access to health care in the border region will continue to stagnate.

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CHAPTER 4

MATERNAL, INFANT, AND CHILD HEALTH

Introduction

Assuring the health of mothers, infants and children in the border region is critical for the continued growth and good health of this population. The health of mothers before and during pregnancy is important for good birth outcomes; ensuring that mothers survive and remain healthy after pregnancy is necessary for the growth and development of their children. Access to care is essential if infants and children are to receive routine physical exams, screening, and childhood vaccinations, as well as for monitoring of their growth and development. Parents and schools both play an important part in providing children with a healthy diet and lifestyle, including appropriate physical activity. Thus, health-care professionals, parents, educators, mentors, and others all need to be involved in ensuring that border youth enter adulthood in good physical and mental health.

The U.S.-Mexico border is home to a young and rapidly growing population. Providing the public and private health care services required by this population will call for substantial investment, now and into the future. Hispanic border residents in particular suffer from many disadvantages including low socioeconomic status, limited access to health care, and various risk factors. Yet they manage to have good health outcomes, particularly regarding maternal, infant and child health. This phenomenon of good health status for Hispanics, despite a variety of socioeconomic and other disadvantages was described as an "epidemiological paradox" (Markides, & Coreil, 1986). More recently it has become known as the "Hispanic paradox" (Hunt et al., 2002).

This chapter draws on available information from national and state-level datasets to describe the health status of mothers, infants and children living in the border region. Information regarding health behaviors and other factors associated with key indicators and outcomes are examined. The accuracy of the "Hispanic paradox" as it applies to maternal, infant, and child health of Hispanics on the U.S.-Mexico border also is assessed.

Maternal-Child Health and Healthy Border 2010

The importance of maternal, infant, and child health in the border region is reflected in the fact that six of the 20 objectives of Healthy Border 2010 are directly related to maternal, infant and child health (U.S.-Mexico Border Health Commission, 2003). The objectives that relate to maternal, infant, and child health and their 2010 targets are:

- *Infant mortality*: Reduce the infant mortality rate by 15 percent;
- Congenital anomalies: Reduce infant mortality from congenital anomalies by 30 percent;
- *Prenatal care*: Increase the proportion of mothers initiating prenatal care in the first trimester to 85 percent;
- *Early teen births*: Reduce the pregnancy rate in adolescents 15-17 years of age by 33 percent;
- *Immunization coverage*: Raise immunization coverage among children 19-35 months of age to 90 percent;
- *Childhood injuries*: Reduce the childhood injury death rate by 30 percent.

Two additional Healthy Border objectives – reducing motor vehicle crash deaths and asthma hospitalization – also address two important causes of morbidity and mortality among border youth.

Methods

This chapter presents information on current maternal, infant, and child health status in the border region, defined as the 44 counties on or near the U.S.-Mexico border. A major challenge for any health study involving counties, particularly those with small populations, is locating accurate and relevant health data. Most surveys are designed to produce national or state-level estimates, and few counties have the resources to collect their own health data. As a result, most of the statistics used in this report are based on administrative data, principally information from birth and death certificates. Some information on hospital stays is derived from state-based hospital discharge data systems. State-level information on vaccination coverage levels comes from the National Immunization Survey (Centers for Disease Control [CDC], 2006a).

Natality and mortality information for the border region presented in this chapter is based on all births and deaths occurring in the United States to residents of the 44 border counties. This information is used to compare and contrast various measures for the border region, border states, and the United States. Within the border region, the same measures are compared across the combined border counties of each state. Because of substantial differences in birth and death outcomes for Hispanics and non-Hispanic whites, many birth and death measures are presented separately for these two ethnic groups.

The most recent national natality and mortality data available at the time this report was prepared were based on births and deaths occurring in 2004. Every effort has been made to present the most recent data available, but in numerous cases it was necessary to combine birth or death data for several years in order to present statistically reliable measures. This was particularly necessary to make reliable comparisons across states, by ethnicity, sex, and/or age group.

Natality data were used to measure a variety of maternal health characteristics including maternal medical risk factors; complications of pregnancy, labor, and delivery; maternal race, ethnicity and age at delivery; and maternal access to prenatal care. Natality data also were used to measure birth outcomes, including gestational age, birthweight, multiple births, and method of delivery, as well as other characteristics such as attendant at birth and place of delivery. Natality data also provided the denominators for infant mortality rates. Mortality data provided information on the decedent's age, sex, race and ethnicity, as well as the cause of death.

Population: Women of Childbearing Age and Children

During the 1990s the number of women of childbearing age (15-44 years) in the border region grew rapidly, as did the number of children. The number of women 15-44 years of age rose by more than 12 percent over the decade, more than double the national growth rate of 4.8 percent. The number of children 0-14 years of age increased by nearly 19 percent, compared to an 11 percent rise for the nation. Within the border region the largest increases were in the Texas border counties, both for women of childbearing age (20 percent) and children (24 percent). The rapid growth in both the number of women of childbearing age and children sets the stage for sustained rapid growth of the border population into the future.

Growth patterns were markedly different for the two major border ethnic groups, Hispanics and non-Hispanic whites. Population growth was especially strong among Hispanics, with an increase of 35 percent or more over the decade for both women of childbearing age and children. Population growth among non-Hispanic whites was almost the mirror image of the Hispanic trends: the number of childbearing women fell by 11 percent and the number of children dropped by 8 percent over the decade. As large and striking as the border Hispanic increases were, they were surpassed by Hispanic population growth at the border state and national levels. The female childbearing population grew by 43 percent in the border states and by 52 percent at the national level over the same period. Growth of the 0-14 year age group was slightly higher — 46 percent for the border states and 57 percent for the nation. However, as discussed later in this chapter, Hispanic birth rates in the border counties are higher than or equal to Hispanic fertility for the border states or for the United States as a whole. Thus the higher Hispanic childhood growth rates in non-border areas are likely due in part to Hispanic migration into non-border areas of the United States.

Natality

Number of births

More than 125,000 births took place in the border region in 2004, a slight increase from the year 2000. Although the California border counties had the largest total population on the border, the largest number of births took place in the border counties of Texas. The majority of border births were to Hispanic mothers, for all 44 border counties and for the border counties of each state. Nationally, Hispanic births were slightly less than one-quarter of the U.S. total.

Recent trends in the number of births are somewhat different than the trends in the number of women of childbearing age or of children. As **Figure 1** shows, between 2000 and 2004 the percent increase in births in border counties was about four percent overall and similar across each border state; the national increase was much lower (1.3 percent). Among Hispanics, births in the border counties grew by 7 percent, less than the 10 percent increase in the border states and less than the 16 percent rise in Hispanic births for the United States as a whole. Among non-Hispanic whites the number of births fell from 2000 to 2004. The number of non-Hispanic white births declined by more than nine percent in the border counties, while the percentage decline was smaller at the border state and national levels. In the border area of Texas the number of births to non-Hispanic whites fell by more than 30 percent.

Border birth rates

Birth rates, as opposed to the number of births, provide a better understanding of the fertility behavior of a population. The crude birth rate measures the number of births per 1000 population, providing a measure of fertility that is independent of population size. The fertility rate measures the number of

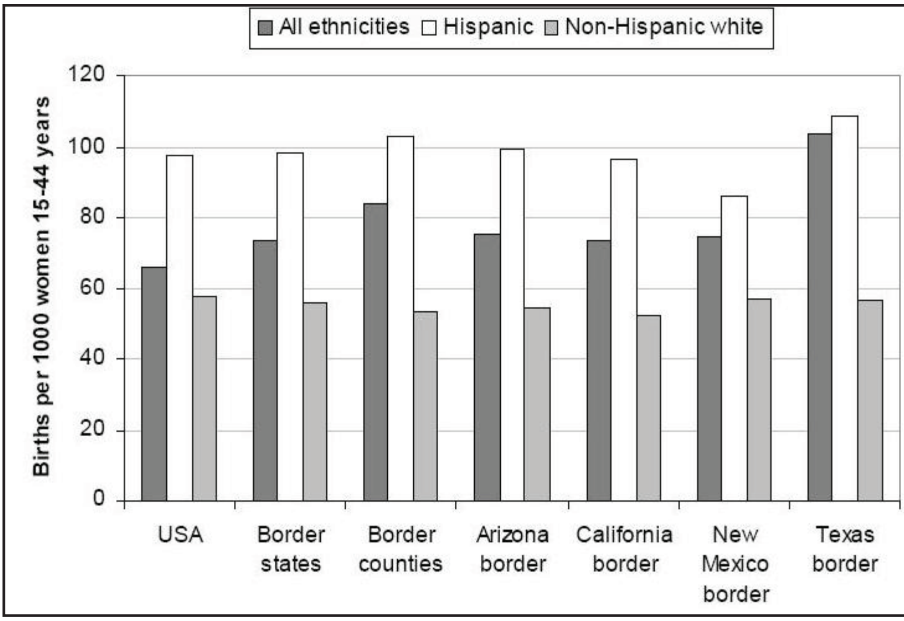

***Figure 1*: Fertility rates, USA and US-Mexico border, 2004**

Source: National natality data, NCHS/CDC

births per 1000 women of childbearing age, thus taking account of the effects of both population size and composition on the number of births. The total fertility rate estimates the total number of births that each woman could have over her reproductive lifetime. The total fertility rate assumes that each woman's reproductive behavior over her lifetime will follow the current age pattern of childbearing in the total population. For example, the total fertility rate for U.S. women in 2004 was 2.0. This means that women in the United States could expect an average of 2.0 births over their lifetime if their childbearing matched the birth rates reported by each five-year age group of U.S. women during the year 2004.

All three measures come to the same conclusions regarding the reproductive behavior of women on the border. Figure 1 presents fertility rates for the United States, border states and border counties in 2004. Overall, fertility rates for the total population and for Hispanics were significantly higher in the border region than for the nation, and also higher than the four border states combined. Within the border region, Texas border counties had the highest level of childbearing (103.4 per 1,000 women 15-44 years versus 84.0 in the region as a whole), due mostly to higher rates among Hispanics. Hispanic fertility rates in the border region were nearly double the rates for non-Hispanic whites, although the disparity was reduced in the New Mexico border counties, where the Hispanic rate was 50 percent higher than the white non-Hispanic rate.

Age-specific fertility

For demographers, the age pattern of fertility is important in describing the reproductive behavior of women, in analyzing current fertility trends, and in preparing population projections for future years. In terms of public health, age-specific fertility data are most useful in providing information on births to high-risk mothers, that is, women in their early teens and those aged 35 years or more. Birth data by age of mother are also useful in understanding differences in the reproductive behavior of different population groups.

The age-pattern of childbearing illustrates the differences in reproductive behavior between the border and the nation as a whole, as shown in **Figure 2**. Age-specific birth rates measure the number of births per 1000 women of a particular age group. The border birth rate for all ethnicities was substantially higher than the U.S. national rate among teens (15-19 years of age) and among women in their twenties. The border rate exceeded the national rate by 50 percent for teen births, and by 33 percent for births to women aged 20-24 years. The U.S. and border rates converged for women in their 30s and older, although the border rate never fell below the national rate.

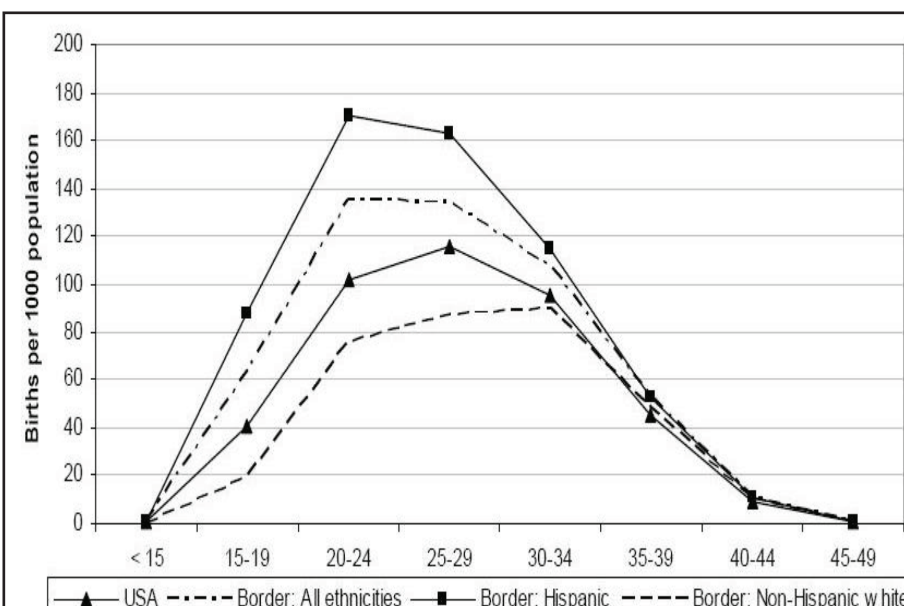

***Figure 2*: Birth rates by age and ethnicity, USA and US-Mexico border, 2004**

Source: National natality data, NCHS/CDC

The two major ethnic groups living in the border region displayed significantly different patterns of childbearing by age: The border Hispanic birth rate for teens 15-19 years of age was more than four times the birth rate for non-Hispanic white teens (88 versus 20), and the Hispanic birth rate was double the non-Hispanic white birth rate for women in their twenties (170 versus 76). For women aged 40 years or more, birth rates were roughly the same for border Hispanics and non-Hispanic whites. Overall, there was a much higher rate of childbearing among Hispanic women. In 2004, the total fertility rate (number of births expected over their lifetime) was 3.0 children for Hispanic border women, as compared to 1.7 among non-Hispanic white border women, and 2.0 among women of all ethnicities nationwide.

Hispanic fertility is unusual not only because of its very high level but also because of the very high birth rates among very young women and somewhat higher rates among older women. Disaggregating the border Hispanic birth rate into women born in the United States versus those born abroad may help to explain this unusual fertility behavior, as the fertility behavior of immigrants may differ from that of Hispanic women born in the United States. It was not possible at the time of this writing to compare birth rates for these two groups because population data on mother's country of birth are not available by sex or age, but it was possible to compare the percent distribution of births by mother's age.

Among U.S.-born border Hispanics in 2004, the proportion of births to teenage mothers was much larger than for foreign-born teens, 20 percent versus 13 percent, as depicted in **Figure 3**. In contrast, the proportion of births to foreign-born border women aged 35 years or more was nearly double the proportion for U.S.-born women (13 percent versus 7 percent). Thus the relatively high levels

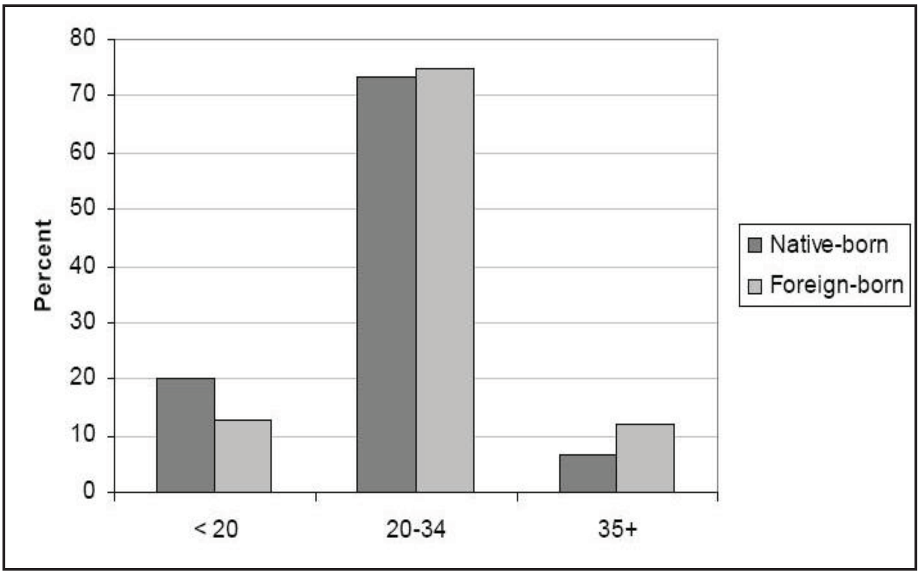

***Figure 3*: Percent distribution of births, border Hispanic women by age and place of birth, 2004**

Source: National natality data, NCHS/CDC of fertility at both ends of the childbearing years for border Hispanic women may be due to the behavior of two different groups: U.S.-born Hispanic women for teenage childbearing; and foreign-born Hispanic women for births to older mothers. Confirmation of this observation through birth rates will have to await the availability of denominators, that is, the number of women by sex, age, and country of birth.

Risk Factors

Socioeconomic status

Social and economic status have long been considered important factors in fertility and maternal and infant health (Chandra, Martinez,, Mosher, Abma, & Jones, 2006; Dye, 2005; Martin et al., 2006). The relationship between socioeconomic status and these outcomes is complex and is believed to be mediated via a number of other factors, including behavioral issues such as maternal smoking, maternal health before pregnancy, nutritional factors, access to health care, and others (Institute of Medicine, 1985). In general, higher levels of income and parental education are associated with lower levels of unfavorable outcomes, such as low birthweight (LBW) and infant mortality. This inverse relationship has been found not only in the United States but in other developed countries as well (National Center for Health Statistics, 1992). Most studies of this relationship, however, find that racial and ethnic disparities in birth outcomes are not fully explained by socioeconomic differences (Bilheimer, 1992; CDC, 2002; Kleinman & Kessel, 1987).

Some information on socioeconomic status in relation to births for the border region is available from birth certificate data. The birth certificate requests information on both mother's and father's education, but paternal education data are incomplete, in particular for Hispanic births. **Figure 4** illustrates large differences in the educational achievement of Hispanic and non-Hispanic white women in 2004. Although Hispanic and non-Hispanic white mothers are slightly more educated in the border region than at the national level, the disparity between them is greater on the border. The proportion of mothers with less than 12 years of education was six times higher among Hispanics than among non-Hispanic whites (42 percent versus 7 percent). Nationally, the Hispanic proportion with less than 12 years of education was 4.5 times the proportion for non-Hispanic white mothers (48 percent versus 11 percent). In addition, a substantial proportion of Hispanic mothers had completed less than seven years of education. This proportion was about 8 percent in the border region and 15 percent nationally, as compared to about 0.2 percent for non-Hispanic white mothers (data not shown).

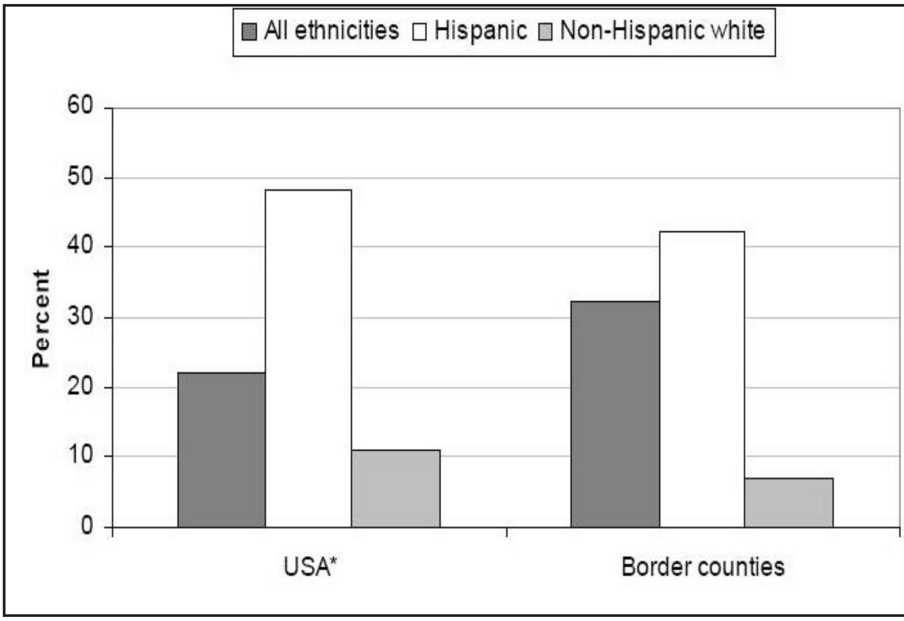

***Figure 4*: Proportion of mothers with less than 12 years of education by ethnicity, USA and border counties, 2004**

USA figures do not include data for Florida, Idaho, Kentucky, New Hampshire, New York State (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington.

Source: National natality data, NCHS/CDC

Births to early teens and older women

Childbirth during adolescence or at older ages is a risk factor for both infant survival and maternal health. Infant mortality has a number of risk factors, but the risk of infant death is clearly higher for births to women in their early teens (less than 18 years of age) and those aged 35 years or more (Mathews, & MacDorman, 2007). Ectopic pregnancy, an important risk factor for maternal death, is much more common among women aged 35 or above (CDC, 1995). Complications of labor and delivery are also more common for both younger and older mothers (Martin, Hamilton, Ventura, Menacker, & Park,, 2002; Notzon et al., 1994).

The number of early teen births decreased by about three percent in the border region from 2000 to 2004. The decline occurred among women aged 15-17 years and those under age 15. Most of the decline took place in the California and Arizona border counties, primarily San Diego County, California and Pima County, Arizona. In addition, the birth rate for border women under 18 years of age fell by almost eight percent in the same interval, from 43.3 to 39.9, or 24 percent of the Healthy Border target for the year 2010. While this decrease was notable, it was much less than the national decline in the early teen birth rate, which fell by 18 percent. Reductions in the birth rate for border women under

18 years varied widely by ethnicity. The Hispanic rate declined by about four percent, while among non-Hispanic whites the rate fell by more than one-third.

Childbearing among older women has increased substantially in recent years at the national and border county levels. From 2000 to 2004 the number of births to border women 35 years of age or more increased by eight percent, and births to border women aged 40 years or more increased even faster (10 percent rise). These increases were somewhat less than national trends. In terms of the birth rate for women aged 35 years or more, the rate for border women in 2004 was significantly higher than the U.S. national rate: 31.6 births per 1000 women versus 26.5 for the United States. Since 2000 the border birth rate for older women has risen at roughly the same pace as for the nation as a whole. The border birth rate for older non-Hispanic white women was less than the Hispanic rate, 27.8 versus 32.3 in 2004.

Tobacco and alcohol use during pregnancy

Maternal smoking and drinking during pregnancy are well-established risk factors for a variety of poor outcomes. Tobacco use has been associated with LBW, spontaneous abortion, preterm delivery, and infant death; alcohol use has been linked to fetal alcohol syndrome and preterm delivery (Jones, 1986; Kleinman & Madans, 1985; Lundsberg, Bracken, & Saftlas, 1997; Pollack, 2001; Zuckerman, 1998). In 1995, costs of complicated births that could be attributed to smoking were estimated at $1.4 to $2.0 billion (CDC, 1997).

Although there may be some underreporting of maternal smoking on the birth certificate, in part because of the stigma associated with tobacco use and poor birth outcomes, variations in smoking among population subgroups are generally consistent with other data sources. For example, the U.S. National Survey of Family Growth in 2002 reported a smoking rate during pregnancy of 5.1 percent for Hispanics versus 17.1 percent for non-Hispanic whites (Chandra et al., 2006). CDC's Pregnancy Risk Assessment Monitoring System (PRAMS) found that 4 percent of Hispanic women smoked during the third trimester of pregnancy as compared to 16.8 percent of non-Hispanic whites, although this study was limited to 27 states, only one of which (New Mexico) borders Mexico (McDonald, Suellentrop, Paulozzi, & Morrow, 2007). Differences in maternal smoking rates by ethnic group have also been found in other studies (Barnett, 1995; Ebrahim, Floyd, Merritt, Decoufle, & Holtzman, 2000).).

Maternal smoking rates have declined since 1990 in the United States as well as in the border region. At the national level, the percent of mothers smoking during pregnancy fell from 18.4 percent in 1990 to 10.2 percent in 2004. Similar declines have been reported for Hispanics and non-Hispanic whites. Smoking rates differ substantially by ethnicity, however. For the United States as a whole in 2004, only 2.6 percent of Hispanic mothers reported smoking during pregnancy, versus 13.8 percent of non-Hispanic whites. Maternal smoking rates were lower on the border, with an overall border rate of 2.2 percent in 2004, only 1.0 percent for Hispanic mothers and 8.9 percent for non-Hispanic whites.

Because smoking data were not available for some states with traditionally higher smoking rates during pregnancy, these smoking rates may be underestimated. The border rates may be even more underestimated than the national rates, however. California does not collect information on smoking on the birth certificate, and the other three border states continue to use the 1989 smoking question which tends to underestimate the true level of maternal smoking. The 1989 smoking question asks a simple yes/no question on tobacco use during pregnancy, while the revised smoking questions on the 2003 standard birth certificate ask for tobacco use during each trimester of pregnancy. The revised smoking questions have resulted in increases in reported smoking rates in the seven states that have adopted the new standard certificate (Martin, & Ventura, 2006). Nevertheless, large ethnic differences in maternal smoking rates are expected to remain.

Birth certificate information on maternal alcohol consumption during pregnancy is considered unreliable because of severe underreporting. Maternal drinking rates based on birth certificate data are only one-tenth the level reported by other sources, such as the BRFSS, 1.5 percent versus 15 percent (Ebrahim et al., 1998). Underreporting of maternal drinking on the birth certificate may be due to questions that do not encourage reporting of very light alcohol use, along with the well-known association of maternal drinking with poor birth outcomes. As a result, no birth certificate data on maternal alcohol consumption is provided in this discussion.

Data for 27 states from the PRAMS System indicate a much lower proportion of Hispanic mothers reporting alcohol consumption before pregnancy than non-Hispanic whites (26.8 percent versus 57.6 percent) (McDonald et al., 2007). During the last three months of pregnancy these proportions were much lower for both groups and not significantly different (4.7 percent for Hispanics, 6.5 percent for non-Hispanic whites). Similar data are not available for the border region. Data from National Health Interview Survey indicate large differences in alcohol consumption between Hispanic and non-Hispanic white women 18-44 years of age: 48 percent of Hispanic women are lifetime abstainers versus 18 percent for non-Hispanic whites; 27 percent of Hispanic women are current drinkers versus 54 percent of non-Hispanic whites (Lucas, Schiller,& Benson, 2004). Given these differences, alcohol consumption among pregnant women in the border region is likely to be low, in particular for Hispanic mothers.

Prenatal Care

Access to medical care is a major issue in the U.S.-Mexico border region, as Chapter 3, "Access To and Use of Health Care," has made clear. Pregnant women face barriers to prenatal care similar to the barriers confronting the general population, including lack of health insurance coverage, low income, inadequate supply of health personnel, and lengthy distance to health facilities. For this reason, access to timely prenatal care was selected as a Healthy Border objective, with a 2010 target of 85 percent of women initiating prenatal care during the first trimester of pregnancy.

Access to prenatal care has improved significantly since the beginning of the decade. While initiation of prenatal care in the first trimester has shown little progress at the national level since 2000, the proportion of border women with timely prenatal care rose from 73.2 percent in 2000 to 77.7 percent in 2004, or 38 percent of the 2010 goal of 85 percent. **Figure 5** and **Figure 6** show this trend. Access to prenatal care improved from 2000 to 2004 in the border areas of California and Texas, but deteriorated in the border counties of Arizona and New Mexico. In the California border area, access improved from 82.8 percent to 87 percent, while in the Arizona border region access fell from 70.2 percent in 2000 to 67.5 percent in 2004.

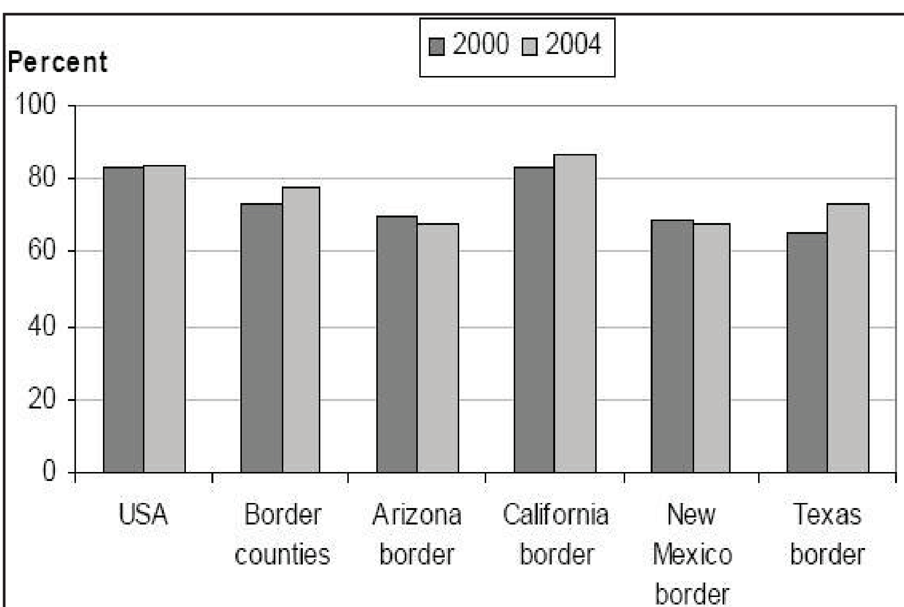

***Figure 5*: Percent of females with prenatal care in first trimester, USA and US-Mexico border counties, 2000 and 2004**

Source: National natality data, NCHS/CDC

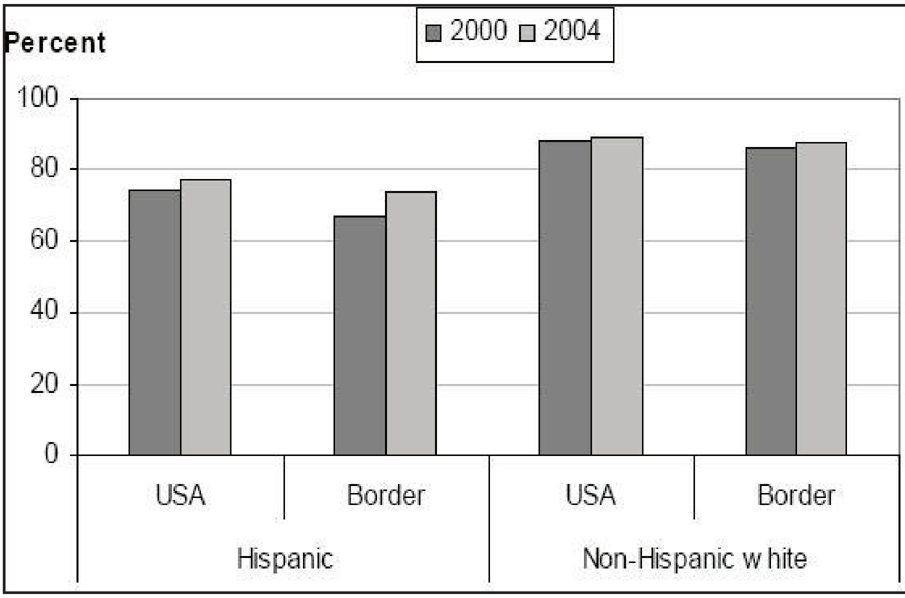

***Figure 6*: Percent of females with prenatal care in first trimester, by ethnicity, USA and US-Mexico border counties, 2000 and 2004**

Source: National natality data, NCHS/CDC

Data on access to prenatal care by ethnicity shows progress for both major ethnic groups, though the groups were beginning from quite different levels. For non-Hispanic whites in the border region, initiation of prenatal care in the first trimester was already above the 2010 target in 2000, at 86.1 percent, and rose to nearly 88 percent in 2004. For Hispanics, the 2000 baseline rate was much lower (68 percent) but prenatal care access rose to nearly 74 percent by 2004.

Access to prenatal care rose substantially from 2000 to 2004 for California and Texas border Hispanic residents but declined substantially for Hispanics in the Arizona and New Mexico border counties (data not shown).

Prenatal care is important not only for health reasons but also for the opportunity to educate and encourage healthy behavior among women and infants. This need is particularly important for young, first-time mothers. **Figure** 7 provides data on the percent of teen mothers (less than 20 years of age) with either late or no prenatal care in 2004. Hispanic teens were significantly more likely than non-Hispanic white teens to receive late or no prenatal care at the national level and in the border counties. The proportion of Hispanic mothers with inadequate prenatal care was especially high in the Arizona border counties (20.2 percent) but was also very high in the New Mexico and Texas border areas (14.8 and 13.0 percent, respectively). There were too few non-Hispanic white teen mothers with inadequate prenatal care in the New Mexico and Texas border counties to produce reliable measures.

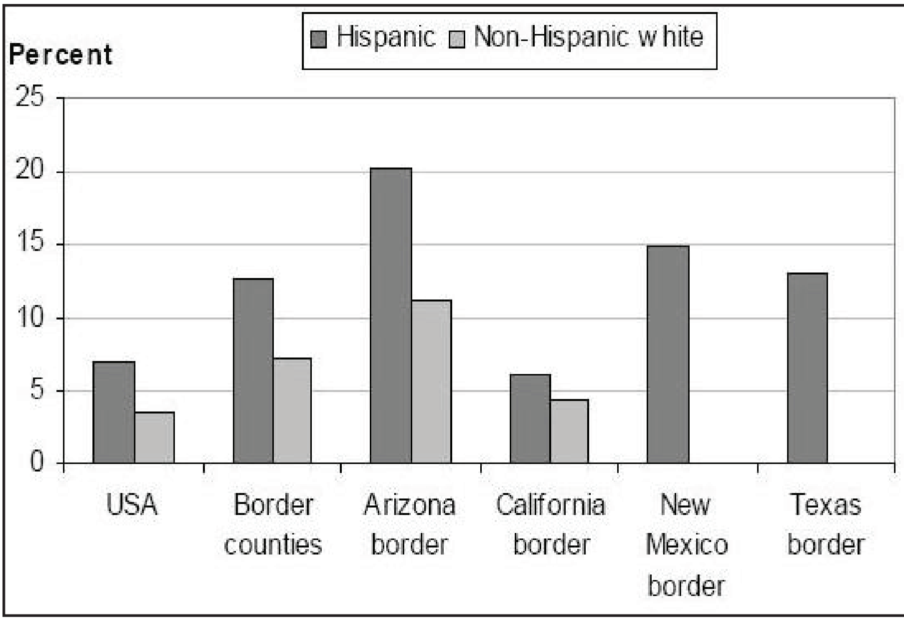

***Figure 7*: Percent of teen mothers with late or no prenatal care by ethnicity, USA and US-Mexico border counties, 2004**

(Figure does not meet standards for reliability or precision.)

Source: National natality data, NCHS/CDC

Pregnancy, Labor, and Delivery

Complications of pregnancy, along with problems of labor and delivery, are associated with unfavorable birth outcomes (Buchanan, 1995; Danforth, 1999; Sibai et al., 1998). Diabetes, hypertension and eclampsia during pregnancy, as well as complications of labor and delivery such as premature rupture of membranes, abruptio placenta, placenta previa, fetal distress, breech presentation, and prolonged or dysfunctional labor all can negatively impact the health of the newborn and may affect maternal health as well.

Along with pregnancy-associated hypertension, diabetes is one of the most frequently reported complications of pregnancy in the United States, affecting two to three percent of pregnancies in recent years. The true proportion of pregnancies complicated by diabetes is uncertain as this condition is likely underreported on birth certificates (Piper et al., 1993).

Maternal diabetes is composed of two different forms: preexisting or pregestational diabetes, and gestational diabetes. Preexisting diabetes represents only about 10 percent of all maternal diabetes, but can give rise to serious maternal and fetal complications (Buchanan, 1995). Overall, the risk of perinatal death is 1.5-2.0 times greater for pregnancies with preexisting diabetes, primarily the result of birth defects and maternal hypertension. Between 10 and 33 percent of these infants will be macrosomic (excessive birthweight). Macrosomia can be an indication for cesarean section delivery, it increases the risk of birth trauma, and it is associated with a long-term risk of obesity for the child. Preexisting microvascular conditions such as retinopathy or neuropathy – two common complications of diabetes – frequently worsen during pregnancy.

Gestational diabetes, or diabetes that develops during pregnancy, accounts for most of the complications of pregnancy due to diabetes that are reported on birth certificates. Gestational diabetes may increase the risk of perinatal death or morbidity, and mothers are clearly at increased risk for subsequent development of diabetes (Coustan, 1995).

The proportion of mothers with diabetes was low at the national level, but lower still for the border counties (2.9 percent and 1.9 percent, respectively). The border diabetes prevalence was significantly higher for Hispanics than for non-Hispanic whites (1.9 percent versus 1.5 percent). For pregnancy-related hypertension, the border rate again was lower than the national rate, but among border residents the rate was higher for non-Hispanic whites than for Hispanics. For most of the reported medical complications of pregnancy, the national prevalence was significantly higher than in the border counties. As noted earlier, medical complications are likely to be underreported on the birth certificate. The level of underreporting may be greater in the border counties than at the national level in part because border birth certificates have higher levels of non-response than national data for many variables.

Method of delivery

The cesarean section delivery rate (that is, the percent of live births delivered by cesarean section), has increased substantially in recent years for both the United States and for all parts of the border region. Cesarean delivery rates had declined through the mid-1990s, partly because of an emphasis on trial of labor for women with a previous cesarean delivery. The national cesarean rate has risen consistently since 1996, the result of several trends. First, the rate of vaginal birth after cesarean (VBAC) has fallen dramatically since 1996, in part because of studies describing the risks associated with VBAC delivery (Lydon-Rochelle, Holt, Easterling, & Martin, 2001). In addition, the primary cesarean rate, that is the cesarean rate for women without a previous cesarean, rose significantly after 1997, a trend resulting from a variety of factors (Martin et al., 2006).

Across the United States, the cesarean section rate increased by more than one-quarter between 2000 and 2004, as shown in **Figure 8**. Nationally, 29 percent of deliveries were by cesarean section in 2004, up from 23 percent in 2000. The border cesarean rate in 2004 was even higher at slightly more than 31 percent, rising from the 2000 rate of 25 percent. There were important regional differences within the border area. The Texas border region had a cesarean rate of nearly 37 percent in 2004, while the New Mexico and Arizona border counties had much lower rates (25 percent and 23 percent, respectively). Among individual counties, the highest rate in 2004 was in Starr County, Texas (46 percent) and the lowest was in Cochise County, Arizona (21 percent; data not shown). The cesarean rate for border Hispanics was somewhat higher than for non-Hispanic whites (33 percent versus 29 percent), but the same strong regional differences prevailed (data not shown).

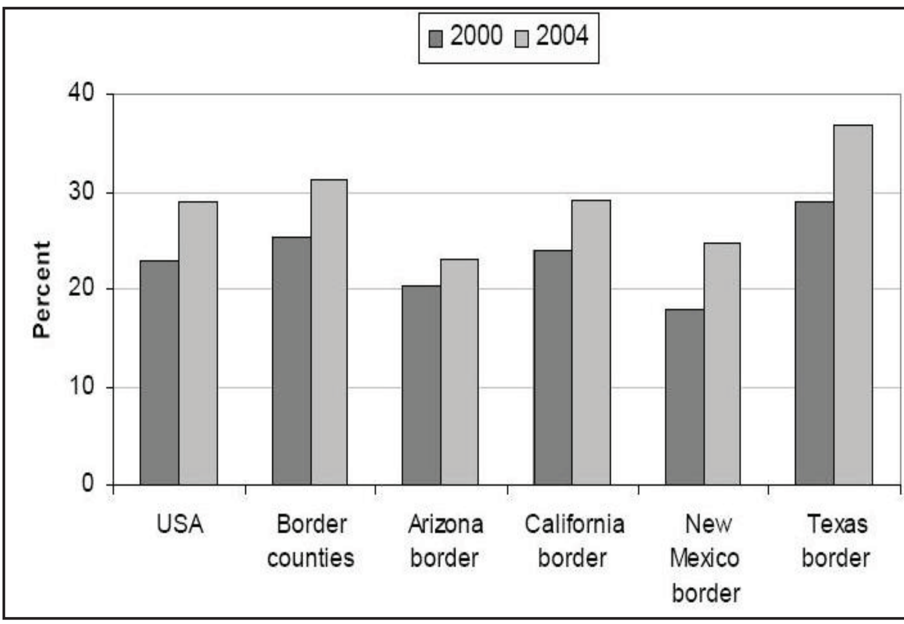

***Figure 8*: Cesarean section rates, USA and US-Mexico border counties, 2000 and 2004**

Source: National natality data, NCHS/CDC

Place of birth and birth attendant

The overwhelming majority of births take place in hospitals, and more than 9 out of 10 deliveries are attended by physicians, both nationally and in the border region. In 2004, slightly more than 99 percent of births in the United States occurred in hospitals; in the border region the proportion was 99 percent as well, with slightly more Hispanic births in hospitals (99 percent) as compared to non-Hispanic whites (98 percent). Since 1990 the proportion of Hispanic births in hospitals has risen from 94 percent, while for non-Hispanic whites there has been little change since 1990. The major change in place of delivery has been in the use of birthing centers: As shown in **Figure 9**, the use of these centers in the border region declined from 2.6 percent of all births in 1990 to less than one percent in 2004; in the Texas border counties the birthing center share fell from 7.1 percent to one percent of all births. Birthing centers are designed for low-risk pregnancies and offer fewer routine medical interventions. Some of the decline in use of birthing centers is related to studies of adverse outcomes of vaginal birth after cesarean (VBAC), leading many providers and professional organizations to advise that VBAC only be attempted in facilities with immediate access to emergency delivery (Lieberman, Ernst, Rooks, Stapleton, & Flamm, 2004).

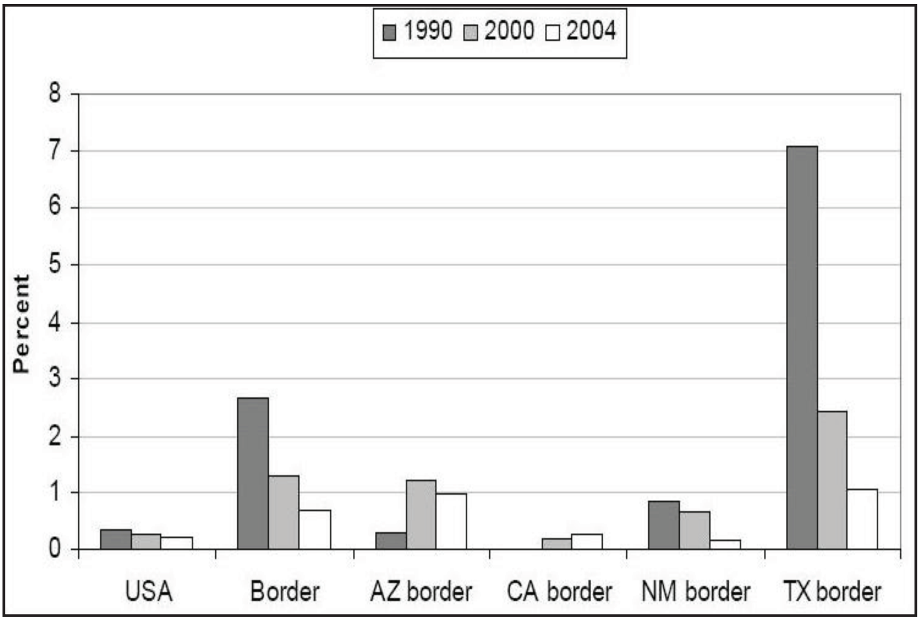

***Figure 9*: Percent of deliveries in birthing centers, US-Mexico border, 1990, 2000 and 2004**

Source: National natality data, NCHS/CDC

Birth attendants are most commonly physicians, although midwives are attending an increasing number of births. About 90 percent of border deliveries are attended by physicians for both Hispanics and non-Hispanic whites. The trend since 1990, however, has been largely toward increasing use of midwives, particularly certified nurse midwives (CNM). **Figure 10** shows the percent of births attended by CNMs in 1990, 2000, and 2004. In the border region, the proportion of births attended by CNMs more than doubled from 1990 to 2000, from 5 percent to 11 percent, although the level fell slightly in 2004. Large increases in the use of CNMs occurred in the border counties of Arizona, California, and New Mexico. In the Texas border area the 1990-2000 increase was smaller, and by 2004 the use of CNMs had receded to below the 1990 level. The use of other midwives also declined in Texas border counties (data not shown).

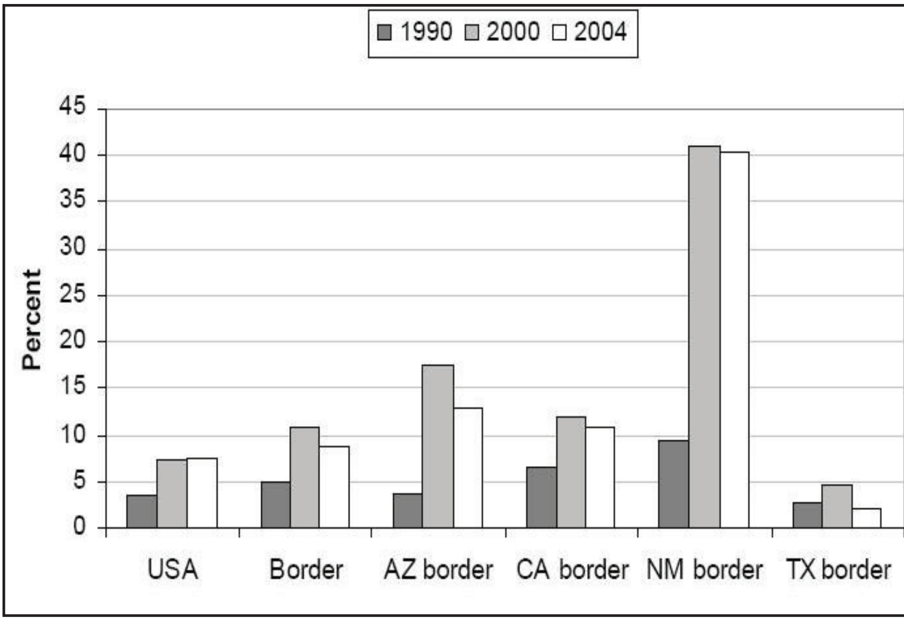

Figure 10**: Percent of deliveries by certified nurse midwife, US-Mexico border, 1990, 2000 and 2004**

Source: National natality data, NCHS/CDC

Birth Outcomes

Preterm delivery

Infants born preterm, that is, at less than 37 completed weeks of gestation, are at greater risk of morbidity or death than are term births, and the risk of infant death is particularly high among the very preterm (less than 32 weeks of gestation). Preterm infants that do survive are more likely to be neurologically impaired, for example due to cerebral palsy (Mathews, & MacDorman, 2007). Despite numerous controlled trials of various intervention strategies over the past few decades, no successful prevention techniques or therapies that would affect substantial reductions in preterm births have been identified (Goldenberg, & Rouse, 1998). Until the causes of preterm delivery are better elucidated, such reductions are unlikely to occur. The increasing proportion of preterm deliveries in recent years has been associated with increasing trends in interventions (induction of labor, cesarean delivery), older maternal age at delivery, and increases in multiple births, among other factors (Martin et al., 2006).

The proportion of infants born preterm has risen steadily in the United States, increasing from 10.6 percent in 1990 to 11.6 percent in 2000 and 12.5 percent in 2004. **Figure 11** illustrates this trend. In the border region the increase has been similar, rising from 10.2 percent in 1990 to 12.4 percent in 2004. Preterm rates increased very little in the California border counties and the 2004 rate of 10.7 percent was significantly lower than that in the border regions of the other three states. The preterm rate was especially high in the Texas border region, reaching 14 percent in 2004 (data not shown). Preterm rates were consistently higher for Hispanics than for non-Hispanic whites, both nationally and in the border region. In 2004, the preterm rate for border Hispanics was 12.4 percent versus 11.0 percent for non-Hispanic whites.

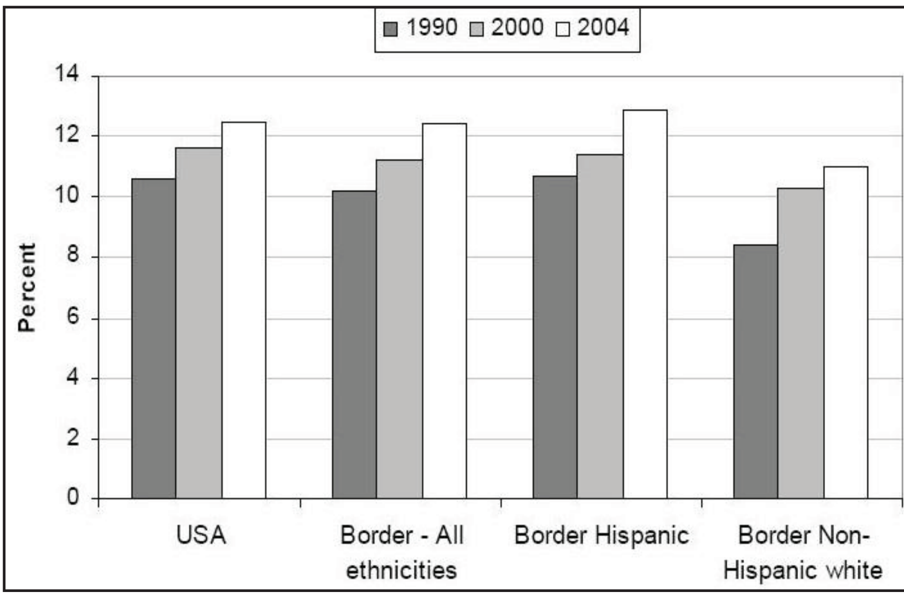

Figure 11**: Percent preterm births based on date of last menstrual period, US-Mexico border counties 1990, 2000 and 2004**

Source: National natality data, NCHS/CDC

These figures are based on the conventional measure of preterm delivery, the interval between the first day of the mother's last menstrual period (LMP) and the infant's date of birth. However, the LMP-based gestational age is subject to a number of errors, including recall error and important levels of non-reporting of LMP. Three of the four border states (Arizona, New Mexico, and Texas) also collect physician estimates of gestational age. These estimates of preterm delivery are 20-40 percent lower than the LMP-based rates, as shown in **Figure 12**. While the physician estimates of preterm delivery also show an increase from 1990 to 2004, the physician-based preterm rates for border Hispanics were lower than or equal to the rates for non-Hispanic whites. In 2004, the physician-based preterm rate for border Hispanics was 9.9 percent, while for non-Hispanic whites the rate was 10.5 percent. Nevertheless, physician estimates of gestational age are also subject to error, and the exact measurement of gestational age remains uncertain (Qin, Hsia, Berg, 2008).

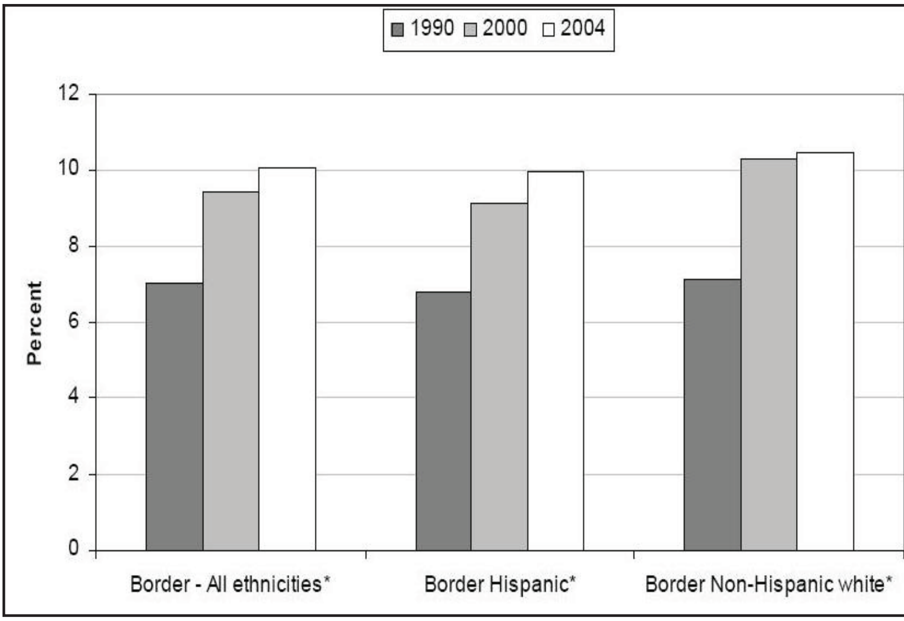

***Figure 12*: Percent preterm births based on physician estimate, by ethnicity, US-Mexico border counties, 1990, 2000 and 2004**

*Border counties of Arizona, New Mexico and Texas only

Source: National natality data, NCHS/CDC

An alternative approach is to consider combinations of gestational age and birthweight. An earlier analysis comparing U.S. Mexican-American births to non-Hispanic white births found many instances of implausible combinations, such as infants weighing more than 3000 grams (6.6 pounds) born at 28 weeks of gestation. These combinations were especially common among Mexican-Americans (Buekens, Notzon, Kotelchuck, & Wilcox, 2000). Repeating this analysis for border counties produced similar results. As shown in **Figure 13**, the Hispanic birthweight distributions were asymmetric and skewed toward heavy birthweights for all gestational ages below 37 weeks. The Hispanic excess for these implausible combinations was especially marked for gestational ages 28-31 weeks and 32-35 weeks. If we exclude all normal birthweight infants (2,500 grams or more) from the preterm deliveries to eliminate potentially misclassified preterm births, the preterm rate for border Hispanics was lower than for non-Hispanic whites (4.2 percent versus 4.4 percent).

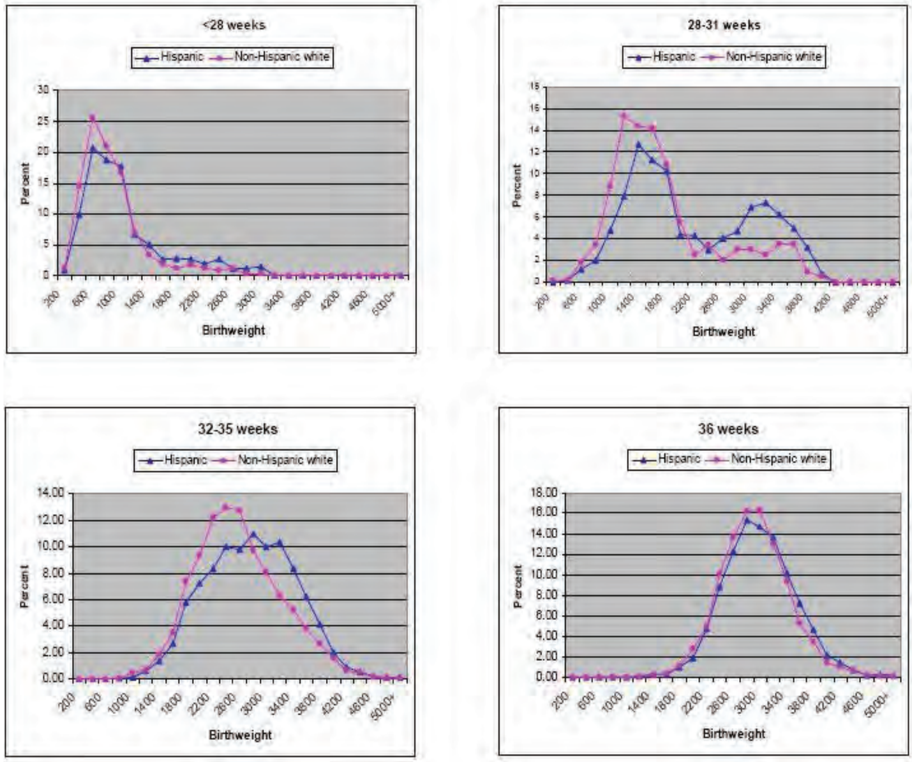

***Figure 13*: Hispanic and non-Hispanic white births by birth weight at <28, 28-31, 32-35 and 36 weeks of gestation, US-Mexico border counties, 2002-04**

Source: National natality data, NCHS/CDC

Birthweight

Low birthweight, or weight below 2500 grams, is highly associated with the risk of infant death. Infants weighing less than 1500 grams, or very low birthweight (VLBW), are nearly 100 times more likely to die in the first year of life than are infants above 2500 grams. The risk of death for infants weighing 1500-2499 grams is nearly five times that of normal birthweight infants (Mathews, & MacDorman, 2007). An infant's birthweight is related to both the length of gestation and the fetal growth rate in utero. Maternal smoking during pregnancy is an important contributor to LBW, primarily through intrauterine growth retardation (Kleinman, & Madans, 1985), although maternal weight before pregnancy and maternal weight gain during pregnancy are also important. VLBW is more closely associated with preterm delivery and its associated causes. A major advantage of birthweight data is that it is much more accurately reported than is gestational age (David, 1980). As with preterm births, some of the increase in LBW in recent years may be related to obstetrical interventions, as well as older maternal age at childbearing and increased numbers of multiple births (Branum & Schoendorf, 2002; Helmerhorst, Perquin, Donker, & Keirse 2004; Zhang, Yancey, & Henderson, 2002).

The LBW rate has risen slowly but consistently in the United States in recent years, increasing from 7 percent in 1990 to 8.1 percent in 2004 (see **Figure 14**). The LBW rate is trending upward both nationally and on the border, and for both Hispanics and Non-Hispanic whites, as depicted in Figure 14. In contrast, the VLBW rate has risen very little in recent years. Nationally, the VLBW rate increased from 1.3 percent in 1990 to 1.5 percent in 2004; in the border region the rate remained at about one percent over the same interval. The VLBW rate for Hispanics and non-Hispanic whites also changed very little over time; in 2004 the VLBW rate was 1.1 percent for both groups.

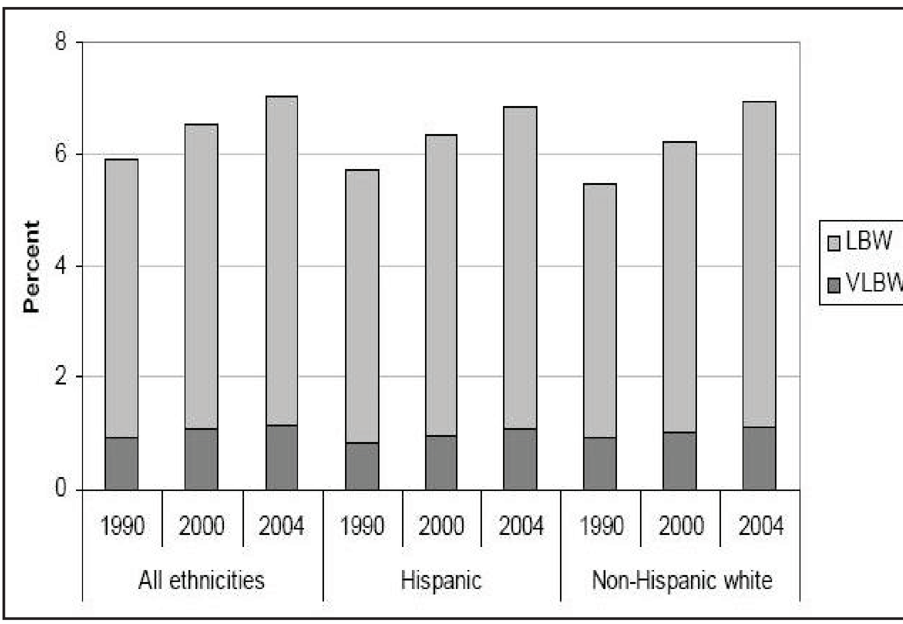

***Figure 14*: Low birthweight and very low birthweight by ethnicity, US-Mexico border counties, 1990, 2000 and 2004**

Source: National natality data, NCHS/CDC

The border LBW rate was significantly lower than the national rate in 2004: 7 percent versus 8.1 percent. In addition, the percent LBW for border Hispanic births was approximately equal to the rate for border non-Hispanic whites: 6.8 and 6.9 percent respectively. The low proportion of births under 2500 grams in the border region, despite high levels of poverty and limited access to medical care, is an important part of the puzzle that is known as the Hispanic paradox (Fuentes-Afflick, & Lurie, 1997; Scribner, 1996; Zambrana, Scrimshaw, Collins, & Dunkel-Schetter, 1997). It has been demonstrated that an important part of the good birthweight performance of Hispanics, who are the majority population on the border, is related to their low preterm delivery rate (once erroneous LMP dates are corrected; Buekens et al., 2000). The low proportion of preterm deliveries among border Hispanics is reflected in the low VLBWrate, which, as noted above, is equivalent to the VLBW rate of border non-Hispanic whites (1.1 percent for both groups in 2004).

Multiple births

The rate of multiple births, that is, the number of twins, triplets, and higher-order births per 1,000 live births, has increased steadily since 1990 in the United States and in the border region. Increases in multiple births are the result of two trends. First, assisted reproduction therapies have had a major impact on the proportion of twin and especially triplet and higher-order births (Wilcox, Kiely, Melvin, & Martin,1996). Second, the increase in childbearing among older women also has raised the number of multiple births since the multiple birth rate is higher for older women regardless of other factors (Martin, MacDorman, & Mathew, 1997). An increase in the multiple birth rate is important because pregnancies involving multiple fetuses increase the likelihood of maternal complications of pregnancy, obstetrical interventions such as cesarean delivery, very preterm delivery, VLBW, and infant morbidity and mortality (Blondel, et al., 2002; Martin et al., 2006; Mathews, & MacDorman, 2007). Several of these outcomes, in particular very preterm delivery and VLBW, are important risk factors for developmental disabilities and infant death.

The multiple birth rate in the border region increased from 20 per 1000 live births in 1990 to 25 in 2000 and 28 by 2004, an overall increase of 40 percent. Nationally, the multiple rate rose from 23 in 1990 to 34 in 2004. The multiple birth rate was lower among Hispanics, both nationally and in the border region. In 2004, the Hispanic multiple rate was 22 nationally and 23 in the border counties. The multiple rate was much higher among non-Hispanic whites, growing from 24 in 1990 to 39 in 2004 both nationally and in the border region, an increase of 60 percent.

Maternal, Infant, and Child Mortality

Maternal mortality

Although less common now than in the past, maternal deaths remain an important indicator of women's health. Furthermore, these deaths also are significant because they are highly preventable and because of the impact of maternal deaths on families. The major causes of maternal death are hemorrhage, pregnancy-induced hypertension, infection, and ectopic pregnancy (MacKay, Berg, Duran, Chang, & Rosenberg, 2005). Many of these causes of death were discussed above in the section concerning complications of pregnancy, labor, and delivery.

As defined by the World Health Organization (1992), maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, regardless of the duration or location of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes. Death certificates alone underestimate the number of maternal deaths, in part because of limitations in the death certificate itself and lack of linkage of birth and fetal death records to adult death records. A comparison of maternal deaths identified by death certificate data and via the Pregnancy Mortality Surveillance System (PMSS) found 35 percent more maternal deaths from the PMSS (MacKay et al., 2005). Another study estimated that maternal death reporting based on the death certificate underreported maternal deaths by more than 50 percent (Jocums, Mitchel, Entman, & Piper,1995).

In 2004, the maternal mortality rate for the United States was 13.1 deaths per 100,000 live births, a 33 percent increase from the 2000 rate of 9.8. Whether this increase in the reporting of maternal deaths is due to improvements in reporting alone, or to an actual rise in the number of maternal deaths is unclear. Some of the increase is the result of improved reporting, including changes in coding practices under ICD-10 and the growing number of states adding a death certificate question on pregnancy status (Hoyert, Heron, Murphy, & Kung, 2006). Continued vigilance is called for in the form of careful monitoring of maternal death reports over the next decade.

In the 44 counties along the U.S.-Mexico border there were fewer than 10 maternal deaths in 2004, too few to produce a statistically reliable rate. Even combining data from several years did not yield sufficient numbers of maternal deaths to produce statistically reliable rates for the border, so it is not possible to detect either an increase or decrease in the maternal mortality rate since 1990. Border states and localities could obtain additional information on maternal deaths by establishing maternal mortality review boards.

Infant mortality

Infant mortality is often used as an indicator of the general health status of a population. It is affected by the level of maternal health as well as by access to prenatal care for the mother and primary health care for the infant. Infant mortality also has a disproportionate effect on life expectancy because infant deaths represent the largest deductions from the expected number of years lived by a population.

The infant mortality rate is commonly divided into the neonatal mortality rate (deaths in the first 28 days of life) and the postneonatal mortality rate (deaths in the remainder of the first year of life). Neonatal deaths are more likely to be caused by problems related to pregnancy and fetal development, such as congenital anomalies, LBW and prematurity, and complications of pregnancy. The causes of postneonatal death are more reflective of post-pregnancy experiences, such as sudden infant death syndrome (SIDS) and injuries.

In developing countries most infant deaths typically occur in the postneonatal period. This same pattern prevailed in developed countries a century or more ago. Improvements in health care, nutrition, and other aspects of modern life have disproportionately reduced postneonatal deaths in developed countries, including the United States, so that about two-thirds of all infant deaths in these countries now occur in the neonatal period. Postneonatal mortality has declined in a similar fashion in the border region, so that by 2004 the border neonatal mortality rate was 3.3 per 1000 live births while the postneonatal rate was 1.6.

The most important cause of neonatal death on the border in 2004 was congenital anomalies (28 percent), followed by disorders related to preterm birth and LBW (17 percent); complications of pregnancy, labor, and delivery (15 percent); and respiratory distress and other respiratory problems of the perinatal period (13 percent). Nationally, the distribution of leading causes of neonatal deaths was roughly the same. The leading causes of postneonatal death in the border region in 2004 were: SIDS (28 percent), congenital anomalies (19 percent), accidents (11 percent), conditions originating in the perinatal period (5 percent), and circulatory illnesses (5 percent).

The infant mortality rate on the border was significantly lower than the national rate in 2004: 4.9 versus 6.8 deaths per 1000 live births (see **Figure 15**). Infant mortality on the border was also significantly lower than the U.S. rate for all ethnicities and for Hispanics. The infant mortality rate for Hispanics, particularly those living near the border, is remarkable given the low income and poor access to care of many border Hispanics – another illustration of the Hispanic paradox. The reasons for the lower rate on the border are much debated, ranging from the good birthweights of Hispanic infants, to the better health of migrants, to arguments concerning data quality. A particular concern involves non-U.S. residents who claim to be U.S. residents, give birth on the U.S. side of the border and then depart the United States. Any deaths among these infants after they leave the country are not included in U.S. mortality data, thus understating infant mortality for border residents (Becerra, Hogue, Atrash, & Perez, 1991; Chan, McCandless, Portnoy, Stolp, & Warner, 1987; Fuentes-Afflick, Hessol, & Perez-Stable, 1999; Markides, & Coreil, 1986).

There is no consensus that non-resident births are an important part of the reason for the very favorable infant mortality rates on the border, and a recent study finds lower early neonatal death rates for the children of Hispanic immigrant mothers in the United States and some areas of the U.S.-Mexico border (Hummer, 2007). However, several studies, in particular the articles by Becerra, et al. (1991) and Chan et al. (1987), provide indirect evidence that infant mortality among Mexican-Americans giving birth on the border is underreported. Although dated, Chan et al.'s analysis of infant deaths in the sister cities of Laredo, Texas and Nuevo Laredo, Tamaulipas provides particularly compelling evidence of underreporting of deaths to infants born on the U.S. side of the border. Nevertheless, even if the Hispanic infant mortality rate for the border were adjusted upward by 50 percent, the adjusted rate would remain remarkably good for such a disadvantaged population.

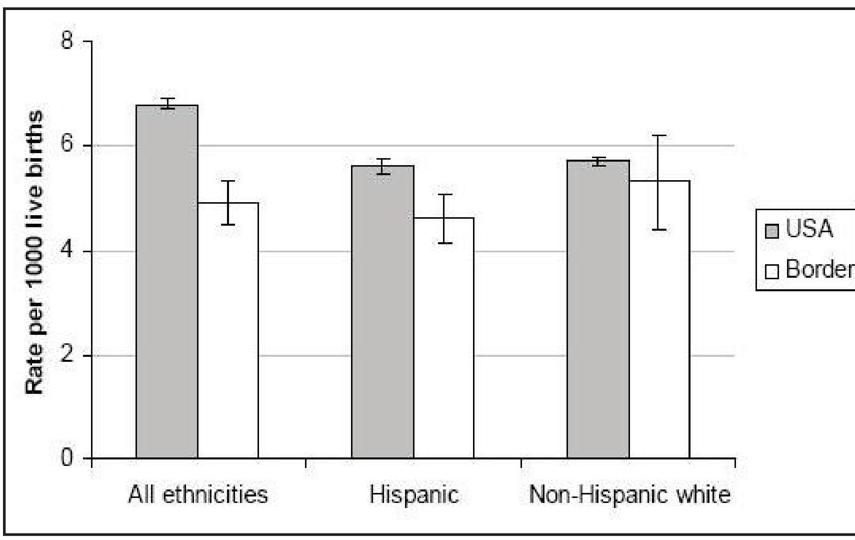

Figure 15**: Infant mortality rates by ethnicity, USA and US-Mexico border counties, 2004**

Source: National natality data, NCHS/CDC

Whatever the reasons for the low rate, infant mortality in the border region has continued to fall in recent years, declining from 5.4 in 2000 to 4.9 in 2004, or 62 percent of the Healthy Border target for the year 2010. Because of the small number of infant deaths in border counties this decline is not statistically significant. However, grouping infant deaths into three-year periods (1999-2001 and 2002-2004) yields a significant decline in infant mortality between the two periods. These results are depicted in **Figure 16**. The decline appears to be confined to border Hispanics, as there was no significant change in infant mortality among non-Hispanic whites in the border region. During the same time periods, the overall U.S. infant mortality rate remained unchanged at 6.9.

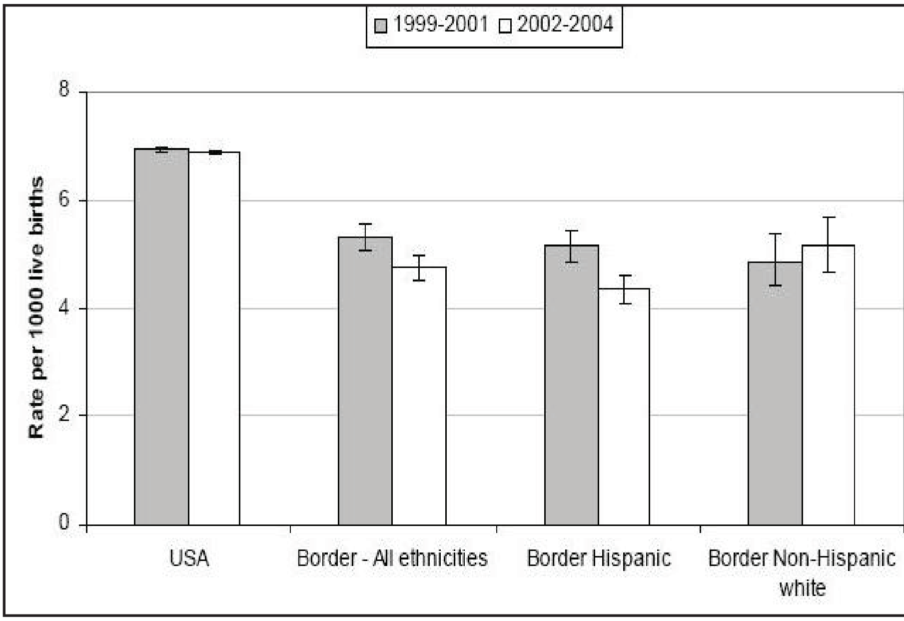

***Figure 16*: Infant mortality rates by ethnicity, USA and US-Mexico border counties, 1999-2001 and 2002-200**

Source: National natality data, NCHS/CDC

Congenital anomalies

Congenital anomalies are a leading cause of infant death in the United States and in the border region. They are also a cause of physical defects, metabolic disorders and disabilities (Stoll, & Kliegman, 2000). Neural tube defects such as spina bifida and anencephaly, which occur when the fetal neural tube fails to fully close, can lead to fetal loss, infant death, or severe disability. Half or more of neural tube defects may be prevented through consumption of adequate amounts of folic acid in the month prior to conception and the first trimester of pregnancy, although the protective effect of folic acid may be less among Hispanics (Werler, Shapiro, & Mitchell,1993; Shaw, Schaffer, Velie, Morland, & Harris,1995). Fortification of all grain products with folic acid was made mandatory in 1998 (U.S. Food and Drug Administration, 1996), and women were advised to consume folate-rich foods and take folic acid supplements. Iron deficiency has also been implicated as a possible contributing cause of neural tube defects in births among border women, but a statistically significant relationship was not demonstrated (Felkner, Suarez, Brender, Scaife, & Hendricks, 2005).

A cluster of deaths due to neural tube defects in the lower Rio Grande valley of Texas in the early 1990s led to an extensive investigation of possible causes and an intensive focus on the incidence of neural tube defects along the U.S.-

Mexico border (Suarez et al., 2000). Although investigations failed to find any explanation for the Texas cluster of deaths due to neural tube defects, subsequent investigations determined that neural tube defect rates among Mexican-Americans were 50 to 200 percent higher than for non-Hispanic whites, nationally as well as in the border region (Harris, & Shaw, 1995; Hendricks, Simpson, & Larsen, 1999). Neural tube defects are responsible for only one to two percent of infant deaths both nationally and on the border, but these studies, along with reports of environmental contaminants, led to increased concern about congenital anomalies of all types in the border region.

Two major challenges stood in the way of developing a Healthy Border objective concerning congenital anomalies. First, congenital anomalies are not well reported on birth certificates (CDC, 2000; Watkins, Edmonds, McClearn, Mullins, Mulinare, & Khoury,1996) and birth defects registries have only recently been established in several of the border states. Second, many congenital anomalies, including neural tube defects, are relatively rare, and the small numbers of births and infant deaths along the border make it difficult to provide reliable data to use in measuring trends. For this reason, the Healthy Border objective concerning congenital anomalies was based on infant deaths due to all congenital anomalies combined.

The Healthy Border objective calls for a 50 percent reduction in infant deaths due to all types of congenital anomalies by 2010. The baseline infant death rate from congenital anomalies in 2000 was 1.5 per 1,000 live births; thus the corresponding target for the year 2010 is an infant death rate of 0.75. In 2004 the infant death rate due to congenital anomalies had fallen to 1.2, meaning that 40 percent of the 2010 target had been attained. However, this decline in the infant death rate was not statistically significant, even when multiple years of data were combined to reduce statistical variability. The border rate also was not significantly different from the corresponding rate for the United States (1.4 in 2000).

Childhood and young adult morbidity

Border children suffer from the usual childhood diseases and a variety of injuries, but are affected by some chronic diseases as well. Public health measures, in particular immunizations, have greatly reduced the burden of many communicable diseases. Injury prevention also has played a role in reducing the number of injuries and in limiting the severity of those that occur. The prevalence of some chronic diseases has increased, however, as a result of increased exposure to certain risk factors.

Hospital discharge data provide some information on childhood morbidity in the border counties. The most important cause of hospital stays among children was respiratory illnesses: the hospital discharge rate for acute bronchitis, pneumonia, and asthma combined was nearly 80 per 10,000 population, far higher than the rate for any other major illness. Hospitalization for asthma has increased rapidly for border children, similar to the nationwide increase and coincident with the general rise in childhood asthma prevalence (English, Von Behren, Harnly, & Neutra, 1998). Increasing levels of atmospheric ozone and particulate matter are thought to be part of the explanation for the rise in asthma prevalence on the border, but incomplete air quality monitoring in the region prevents a definitive conclusion.

The discharge rate for diabetes among border children is relatively low, but data from a number of registry studies in various parts of the United States document increases in type 2 diabetes in recent years (American Diabetes Association, 2000). Much of this increase is thought to be related to the rapid rise in recent years of overweight and obesity in children. Childhood obesity data are not available for the border, but national data show sharp increases in these measures, in particular for Mexican-American youth (Ogden et al., 2006). In addition to dietary changes in recent years, increases in consumption of fats and carbohydrates, childhood overweight and obesity can be linked to a decline in daily exercise, for example the discontinuation of daily school physical education classes (CDC, 2004).

Some of the remaining important causes of hospitalization are two chronic diseases – malignant neoplasms and heart disease – and injuries. The discharge rates for these chronic diseases are relatively low, but these diseases are especially deadly as they are among the leading causes of childhood death. Injury diagnoses - fractures and poisonings - account for a discharge rate of about 15 per 100,000. Poisonings are the cause of very few childhood deaths in the border region, but exposure to poisons is all too common among children. The National Association of Poison Control Centers reports that in the United States in 2005, there were 1.4 million exposures to poisons among children ages 0-13 and an additional 170,000 exposures among teens 13-19 years of age (Lai et al., 2006).

Less important causes of hospitalization in the border region are communicable diseases. This is in large part due to the success of immunization in reducing the incidence of these diseases. Immunization coverage rates have increased gradually, both nationally and in the border region, but still remain far from the goal of 90 percent or more coverage for children aged 19-35 months. In 2005 the coverage rate for the 4:3:1:3 series[1] was 82.4 percent for the United States and near 80 percent for each of the border states (CDC, 2006a).

1 The 4:3:1:3 vaccination series includes diphtheria, tetanus and pertussis; polio; measles, mumps and rubella; and Haemophilus influenzae.

Immunization with hepatitis A vaccine has successfully reduced levels of hepatitis A in the border region. Previously, hepatitis A prevalence was high in the border states, particularly in areas where drinking water was contaminated. Colonias (unincorporated subdivisions lacking infrastructure such as municipal sewage and water service) had particularly high levels of hepatitis A in children (Leach, Koo, Hilsenbeck, & Jenson, 1999). Beginning in 1999, hepatitis A vaccination was recommended in 11 states with elevated rates, mostly in the western United States. Since that time the incidence of hepatitis A in those states has declined to the national average (CDC, 2006b). Within border counties the incidence of hepatitis A for the total population has fallen dramatically, declining from a rate of 25 per 100,000 population in 1998 to less than 5 in 2003 (see Chapter 5, "Communicable Diseases").

Childhood and young adult mortality

Mortality among young persons living in border counties is similar to or lower than national death rates. Although the death rates for ages 1-4 and 15-24 years were lower for border Hispanics ere lower than for non-Hispanic whites between 2002 and 2004, the differences were not statistically significant. For border children 5-14 years of age the non-Hispanic white death rate was lower than the Hispanic rate, but again the difference was not statistically significant.

One issue that is consistent across all of these age groups, as well as for both sexes and the two major ethnic groups, is the importance of external causes of death for young people. As discussed in Chapter 9, "Injuries," motor vehicle crashes are the leading cause of death for all three age groups, males and females, Hispanics and non-Hispanic whites. Other external causes of death, both unintentional and intentional, add to the impact of external causes on the young population of the border. For this reason, data for the most important causes of unintentional injury death are presented separately, rather than combined into a single cause as is done in conventional ranking of the leading causes of death.

Border youth 1-4 years of age: External causes of death accounted for nearly 40 percent of all deaths in this age group in 2002-2004. In addition to motor vehicle crashes, drownings were an important cause of death for this group, as were homicides. Congenital anomalies were the second leading cause of death, although much less important than during the first year of life. The most important of these were congenital malformations of the heart and circulatory system (data not shown). Malignant neoplasms and diseases of the heart, the leading causes of death among adults, were much less important for young children, ranking third and sixth among the leading causes of death. There was little difference in the ranking of causes of death by sex or by ethnic group.

Border youth 5-14 years of age: External causes of death become even more important in this age group, accounting for slightly more than 40 percent of all deaths. Motor vehicle crashes alone were responsible for 24 percent of border deaths for this age group in the period 2002-2004. Malignant neoplasms were the second leading cause, with an increase in both the number of deaths and the death rate as compared to the 1-4 year age interval. The most important sites for cancers for these children were lymphoid and haematopoietic tissue, including Hodgkin's disease and non-Hodgkin's lymphoma (data not shown). Again there was little difference in the ranking of causes of death by sex or ethnicity.

Border youth 15-24 years of age: External causes of death reach their peak in this age group, accounting for more than three-fourths of all deaths. External causes are important not only because of their relative share of all deaths in this age group, but also because of the absolute number of deaths and the death rate due to external causes. From 2002-2004, the death rate due to motor vehicle crashes for this age group was seven times the rate for border youths 5-14 years of age. There were similar large increases in the death rates for homicides, suicides, and unintentional poisoning.

Malignant neoplasms dropped to fourth place among the leading causes, despite a 50 percent increase in the cancer death rate, because of the overall increase in mortality in this age group. Death rates for most of these causes of death are similar for Hispanics and non-Hispanic whites, with a few exceptions. Among 15-24 year olds, the number of homicides was 50 percent greater than the number of suicides, while for non-Hispanic whites the number of suicides was more than double the number of homicides. Similarly, the death rate due to unintentional poisoning for non-Hispanic whites was almost twice the rate among Hispanics.

Conclusions and Recommendations

Maternal, infant, and child health status is surprisingly good in the U.S.-Mexico border region, especially considering the low income and poor access to care of a large part of the population. Hispanic border residents have good birth outcomes in terms of birthweight and the proportion of preterm births, and their infant and childhood death rates are lower than or equal to the average for the total U.S. population. Fertility is very high and increasing, the result of growth in the number of women of childbearing age and high rates of childbirth. Fertility rates are especially high for Hispanic border teens. The high teen birth rate for Hispanic women raises both health and quality of life concerns.

Continued vigilance is required, however, to maintain or reduce current levels of unhealthy behaviors and other risks. Education campaigns are required to continue reductions in the level of early teen pregnancies, to discourage women from smoking or drinking during pregnancy, and to encourage an improved diet including consumption of adequate levels of folates.

Continued enhancements in access to health care are necessary to maintain the increasing trend in access to timely prenatal care. For infants, a regular schedule of well-baby checkups and immunizations is essential. Poor access to prenatal care for Hispanic border teens is particularly troubling and should be addressed. The very high cesarean section delivery rates for certain parts of the border region are also a cause for concern. As pointed out in Chapter 2 of this volume, "The Healthcare Workforce," population growth in the border region is outstripping the supply of health personnel. Thus, some of this improved access to care in the future may have to come from non-physicians such as certified nurse-midwives, physician assistants, and nurse practitioners, as well as laypersons such as community health workers.

Continued efforts are called for to address a number of risk factors for border children and young adults. Rapid increases in childhood overweight and obesity have already increased the level of childhood diabetes and may increase it further. Programs to improve childhood nutrition and increase physical activity are urgently needed. Environmental efforts to reduce certain exposures, such as to atmospheric ozone and particulate matter, are essential to slow or reduce the recent large increases in asthma among border youth. Injury prevention programs, such as requiring bicycle helmets for children and graduated driving programs and alcohol control programs for teens, could do much to reduce injury deaths, which remain the leading cause of death in children. Teen smoking and illegal drug use continue to be important problems in the border region and continued education is called for on these topics. Special efforts are needed to reduce the level of teen suicides and suicide attempts, including access to counseling and to mental health care. Access to health care for border children and young adults should include both routine health-care visits and required immunizations.

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CHAPTER 5

COMMUNICABLE DISEASES

Infectious disease surveillance is a core public health activity that is conducted with the aims of assessing the incidence (i.e., emergence of new cases) and prevalence (i.e., the total number of existing cases) of infectious disease cases. Surveillance activities permit individual states and the nation to implement efforts that may reduce the burden of illness across populations, especially for diseases that can be contained or treated effectively. In addition, monitoring trends in infectious diseases that are deemed notifiable allows for targeted research activities, including development of effective interventions. Prevention and control of infectious diseases also represent important components of federal, state, and local health department activities. This is because infectious diseases can result in significant human and fiscal impacts, such as death, disability and other consequences for individuals, families, communities, health systems, employers and the nation.

Several conditions facilitate the transmission of infectious diseases, including poverty, migration, tourism, food processing and distribution mechanisms, changes to natural habitats, an increased number of individuals with weakened immune systems and others. Factors that affect efforts to control infectious diseases include drug resistance, lack of effective treatments to cure infected persons or to prevent transmission, emergence of new diseases, and factors that facilitate the transmission of disease (Centers for Disease Control [CDC], 1998). Several of these conditions, including poverty, intense human flows, and drug resistance, are characteristic of the U.S.-Mexico border region.

This chapter describes the incidence of infectious diseases and their rates in U.S.-Mexico border states and border counties in 2003. Three classes of infectious diseases are reviewed in this chapter: (a) foodborne and waterborne diseases, (b) other infectious diseases, and (c) sexually transmitted infections. We report on the most recent year of data available, 2003, for foodborne and waterborne diseases and other infectious diseases including for all sexually transmitted diseases, except HIV/AIDS for which we report 2004 data. All rates in this chapter are crude rates obtained by dividing the number of cases by the total population regardless of age. Rates are per 100,000 population.

Data for this report were obtained primarily from the Centers for Disease Control and Prevention (CDC). Tuberculosis data, as well as HIV/AIDS and other sexually transmitted infection data, were provided by each border state. Surveillance practices, resources, and priorities vary from state to state. With the exception of AIDS case reports, race and ethnicity data were not analyzed for this report because of high levels of non-reporting. While extensive efforts were made to ensure the quality and accuracy of data, discrepancies may occur with published data since the CDC's databases are updated regularly.

The chapter is organized in the following manner. For each of the most common conditions, a brief introduction is provided, which includes a summary of the etiology, symptoms, at-risk populations and long-term consequences. Where Healthy Border 2010 (U.S.-Mexico Border Health Commission [BHC], 2003a) objectives are available, they are included. For each border state, disease rates were calculated for its combined border counties. Disease rates for 2003 were compared between individual border states, border counties for each state, and the national level. Following the CDC's data-reporting guidelines, geographic-specific rates were suppressed for many conditions because there were insufficient cases to meet criteria for report-ability.

Significance of Infectious Diseases in the Border Region

The large-scale movement of people, closeness of social interactions, large volume of trade, limitations of public health infrastructure, and environmental conditions are all factors that facilitate transmission of infectious diseases among residents of the U.S.-Mexico border region. From the standpoint of infectious disease monitoring, prevention and control, the border population should be considered as one rather than two separate populations (Weinberg et al., 2003). Binational collaboration on infectious disease issues is challenging since both countries have separate and distinct surveillance and public health systems, with great disparities in available resources, and sometimes different priorities and strategies to address infectious disease issues (Bruhn & Brandon, 1997). Of special public health concern are infectious disease cases or events that have some type of cross-border implication (i.e., binational cases). "Binational infectious disease cases" have been defined as suspected or confirmed cases that traveled or lived in the neighboring country during the incubation period for the disease, or had contact with persons who had been in the neighboring country during the incubation period, or for which binational cooperation is needed for case investigation and/or management (Weinberg et al., 2003).

Binational cases present unique challenges for diagnosis, treatment, and public health follow-up. Close communication and collaboration between Mexican and U.S. health officials is necessary to efficiently monitor and respond to binational infectious disease events in the border region.

Few comprehensive studies of infectious diseases have been performed in the border region. An analysis of 1990-1998 U.S. data showed that, compared to non-border regions, the U.S. border region had a significantly higher incidence of many infectious diseases. Specifically, the border had higher rates of hepatitis A, diphtheria, some childhood vaccine-preventable diseases, salmonellosis and shigellosis, among others. However, disease rates were lower in the border region for malaria, meningococcal disease, invasive Haemophilus influenza and trichinosis (Doyle & Bryan, 2000). Although this study did not analyze tuberculosis, HIV/AIDS or STD data, it has been reported that those issues also pose a serious binational health problem for communities in the U.S.-Mexico border region (U.S. Department of Health and Human Services [HHS], 2000).

The U.S.-Mexico border can also be considered a high risk area for a bioterrorism event. (BHC, 2003b). Because of the incubation period of infectious agents, it would be easy for a terrorist to release agents on the U.S. side and cross the border long before cases of illness were detected. A release of a biological agent in one border city would almost certainly spread to persons on both sides of the border. For those reasons, binational coordinated bioterrorism preparedness and response strategies are needed.

Foodborne and Waterborne Diseases

Foodborne and waterborne illnesses are caused by a variety of bacteria, viruses, and parasites and they impose a heavy burden on society. Waterborne diseases are spread by unsanitary conditions or lack of water treatment facilities. Water pollution is a growing concern in the border regions of both countries (International Boundary and Water Commission, 1998). Rapid population growth has overwhelmed water and sewer systems and water treatment facilities in many communities across the U.S.-Mexico border. The very young, the elderly, and persons with immune system problems experience more serious foodborne illnesses (CDC, 2001). This section addresses some of the most common foodborne and waterborne diseases evident in the U.S.-Mexico border region in 2003.

Recent years have seen a tremendous expansion of international food trade, especially between the United States and Mexico. Globalization in food trade is beneficial for consumers because of the increased availability of varied products year-round, and because of lower prices. There is no reason to assume that food imports are more prone to safety problems than domestic products (Buzby, 2003). However, because of the great volume of products and diversity of countries of origin, the increased movement of food products across borders also creates more opportunities for food safety risks to materialize, especially with fresh produce. In the United States, sporadic reports of foodborne outbreaks have been associated with some imported products, including some originating from Mexico (Anderson et al., 2002; Dentinger et al. 2001; Hutin et al., 1999; Weinberg et al., 2004).

In addition to commercially imported products, a large volume of food products are transported by people traveling from Mexico to the United States. Some foods are for personal use, but others are imported for illegal resale in the United States. Those products, for example Mexican-style fresh cheese made with unpasteurized milk, mostly escape regulatory inspection, have been associated with foodborne outbreaks in the United States, and represent a serious public health risk (Janowski, Ginsberg, Torok, & Gunn, 2005; Kinde et al., 2007).

Inadequate sanitation infrastructure, including sewage and storm drainage systems in some areas of the U.S.-Mexico border region, increases the risk to resident communities of infectious diseases from exposure to contaminated drinking water or human and solid wastes (e.g., release of untreated sewage into rivers or the ocean; HHS, 2000).

Cryptosporidiosis

Cryptosporidiosis is a diarrheal disease caused by microscopic parasites of the genus Cryptosporidium. The parasites can be found in soil, food, water and surfaces that have been contaminated with infected human or animal feces. Consumption of the parasite (for example, drinking infected water in swimming spaces, eating contaminated uncooked foods, or swallowing items that have come into contact with infected spaces) results in infection. Watery diarrhea is the most common symptom of cryptosporidiosis and may develop 2 to 10 days after infection. Other symptoms include dehydration, weight loss, stomach cramps or pain, fever, nausea and vomiting. Some persons may not experience these symptoms. The parasite lives in the intestine of the infected person or animal and may be shed in the feces. An outer shell allows the parasite to survive for extended periods of time in the natural environment; the shell also makes the parasite highly resistant to chlorine-based disinfectants. Persons with severely weakened immune system are at risk for more serious or prolonged disease. Cryptosporidiosis may be diagnosed by laboratory analyses of stool samples, although multiple samples may be needed to confirm a diagnosis. Treatment is available. Persons with healthy immune systems usually fully recover, even without antifungal treatment. The effectiveness of certain treatments in immunosuppressed individuals is variable.

Figure 1 shows Cryptosporidiosis incidence rates by region. In 2003, Cryptosporidiosis infection was observed to be a low prevalence condition in the United States. The national rate was 1.21 per 100,000. Border states showed even lower incidence rates (0.81 in California and 0.36 in Texas). Rates were not reported for Arizona and New Mexico.

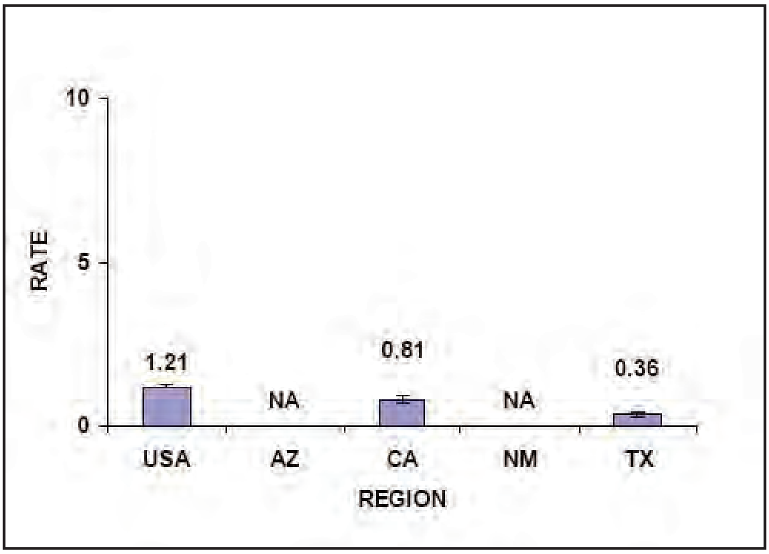

Figure 1: **Crude rates of Cryptosporidiosis (per 100,000) by region, 2003**

E Coli 0157:H7

Escherichia coli (E. coli) 0157:H7 is one strain of the bacterium Escherichia coli. Unlike other strains, E. coli 0157:H7 produces a deadly toxin that can cause severe bloody diarrhea and abdominal cramps. In children younger than five years and the elderly, complications may include hemolytic uremic syndrome, which is characterized by the destruction of red blood cells and kidney failure. Consumers of undercooked ground beef and other food products (e.g., sprouts, lettuce, and unpasteurized milk) can become infected with E. Coli. Inadequate hand-washing techniques may facilitate transmission of the bacteria and persons may also become infected by drinking or swimming in sewage-contaminated water. Symptoms often resolve within 5 to 10 days without antibiotics or other treatments. Yet persons who have developed hemolytic uremic syndrome may experience long-term repercussions such as abnormal kidney function, high blood pressure, seizures, blindness, paralysis, and others. Infection can be prevented by thoroughly cooking ground meat products and washing hands, utensils, and spaces in contact with raw meat with soapy water. Consuming pasteurized products and thoroughly washing fruits and vegetables are recommended. Persons with diarrheal illnesses should avoid swimming in public spaces to reduce contamination.

In 2003, E. Coli 0157:H7 was a low prevalence condition, both nationally and in border states, as shown in **Figure 2**. The national rate was 0.92 per 100,000. Of border states, Texas exhibited the lowest rate (0.25 per 100,000). Rates of E. Coli 0157:H7 for Arizona and California appeared to be similar to the national rate, given their wide confidence intervals.

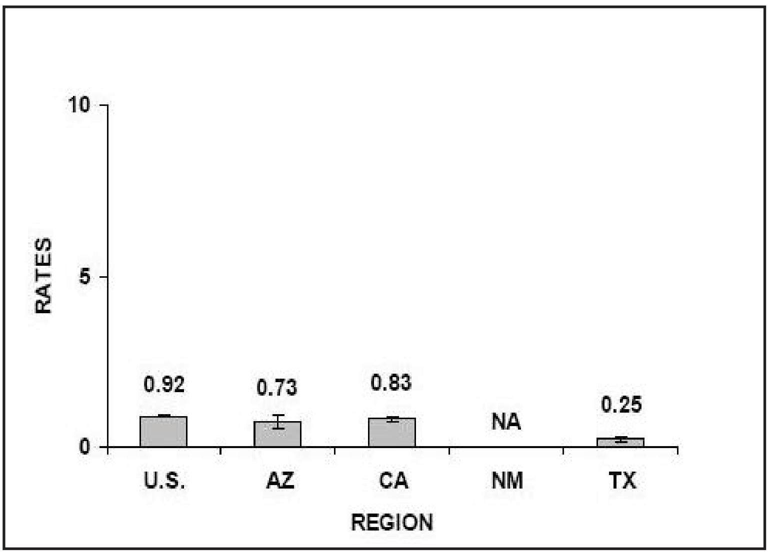

Figure 2: **Crude rates of E. Coli 0157:H7 (per 100,000) by region, 2003**

Hepatitis A Virus, Acute

Hepatitis A is caused by the hepatitis A virus. Symptoms of hepatitis A infection include jaundice, fatigue, abdominal pain, loss of appetite, nausea, diarrhea, or fever and occur most frequently in adults. There is no chronic infection and it cannot recur. Nevertheless, about 15 percent of people infected with hepatitis A will have prolonged or relapsing symptoms over a six to nine month period. The hepatitis A virus is typically spread when a person places into his or her mouth an item that has become contaminated through contact with the stool of an infected person. Persons at risk for infection are household contacts and sexual partners of infected persons, persons residing or traveling to high prevalence areas, men who have sex with men, and injecting and non-injecting drug users. A hepatitis A vaccine is available. Routine vaccination for all children starting at age one year is now recommended in the United States. Currently, the Advisory Committee on Immunization Practices recommends that people traveling to an area with intermediate or high rates of hepatitis A receive one dose of single-antigen hepatitis A vaccine administered at any time before departure (CDC, 2007).

The Healthy Border 2010 objective for the United States for hepatitis A is to reduce the incidence rate by 50 percent, from 11.0 to 5.5 per 100,000 inhabitants (BHC, 2003a). The combined 44 border counties have already surpassed the 2010 objective, as data for 2003 indicate a border rate of 4.6 per 100,000 population (116 percent of the objective).

Figure 3 shows crude rates of hepatitis A. In 2003, the national crude rate of hepatitis A was 2.63 per 100,000 persons. Rates of hepatitis A varied among border states: Arizona had the highest crude rate of all border states (5.02), followed by California (3.23). In contrast, New Mexico exhibited the lowest crude rate of hepatitis A (1.33).

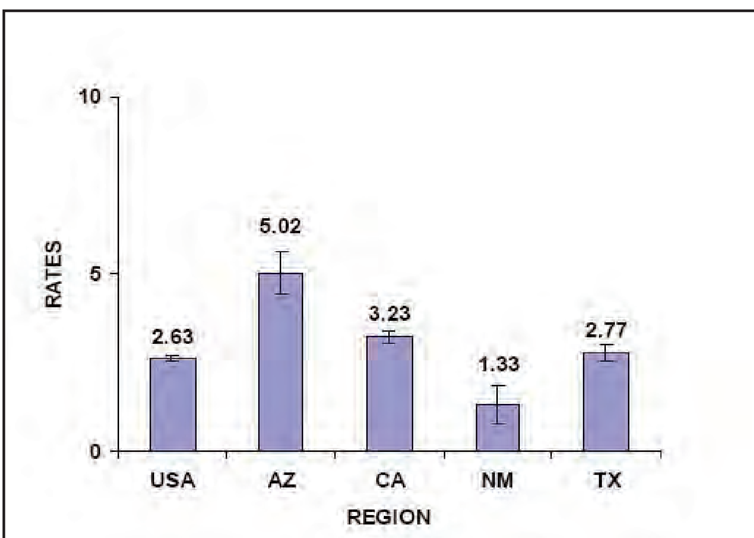

Figure 3: **Crude rates of Hepatitis A. v Acute (per 100,000) by region, 2003**

Hepatitis A infection rates in the border counties were similar to border state rates. **Figure 4** shows hepatitis A rates in the 44 border counties. Arizona border counties reported the highest crude rate of the condition, followed by California (7.19 and 4.89 per 100,000).

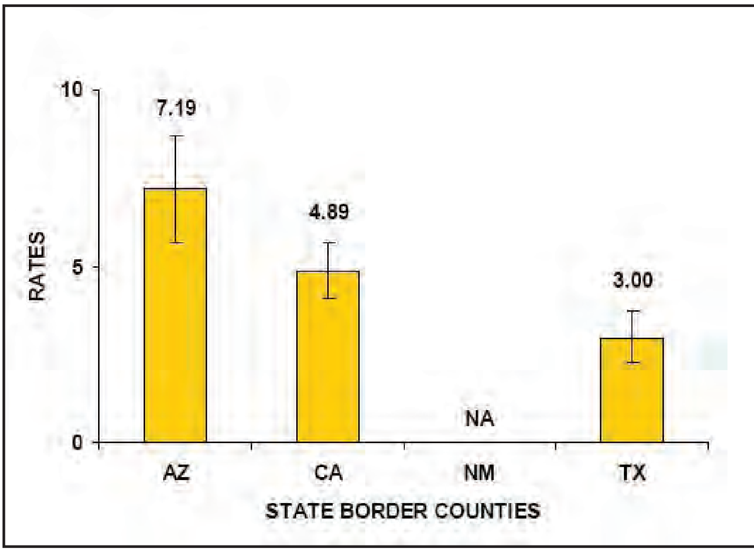

Figure 4: **Crude rates of Hepatitis A. v Acute (per 100,000) by border county, 2003**

Giardiasis

Giardiasis is caused by Giardia intestinalis, a one-celled microscopic parasite that lives in the intestines and stools of infected individuals. Giardiasis can result when the parasite is consumed by drinking contaminated water, infected foods, or through surface contact with infected areas. Persons may experience a variety of symptoms one to two weeks after infection, including diarrhea, gas, greasy stools, stomach cramps, upset stomach, or nausea. Treatment is available through various prescription drugs. Giardiasis is highly contagious. Infected persons should take measures to prevent spreading the infection through use of appropriate hand-washing techniques, especially if eating or preparing foods, and by avoiding public water spaces during and for two weeks after the resolution of diarrheal symptoms.

As Figure 5 shows, rates of giardiasis were below 10 per 100,000 for all regions. Of border states, Arizona (4.59) and New Mexico (2.93) both exhibited rates below the national rate (6.78), while Texas reported no cases in 2003. Rates of giardiasis for California in 2003 were not significantly different from the national rate. Border county data were available only for Arizona and California; in both cases, rates did not differ from state rates (**Figure 6**).

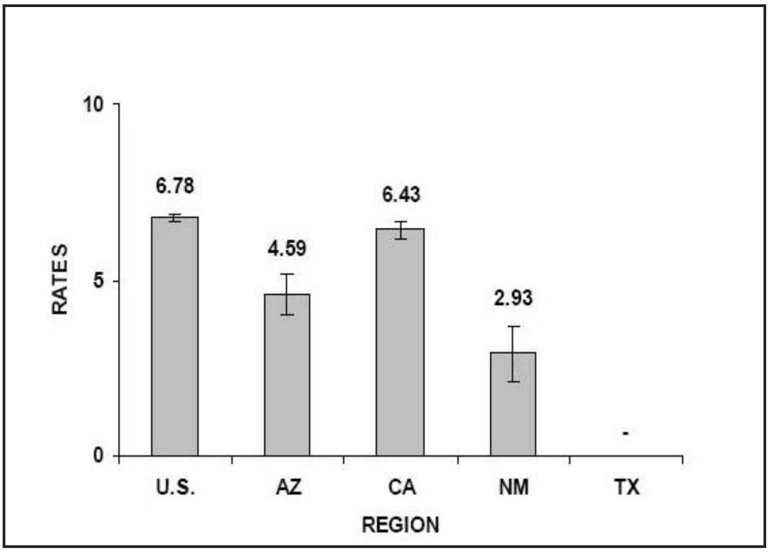

Figure 5: **Crude rates of Giardiasis (per 100,000) by region, 2003**

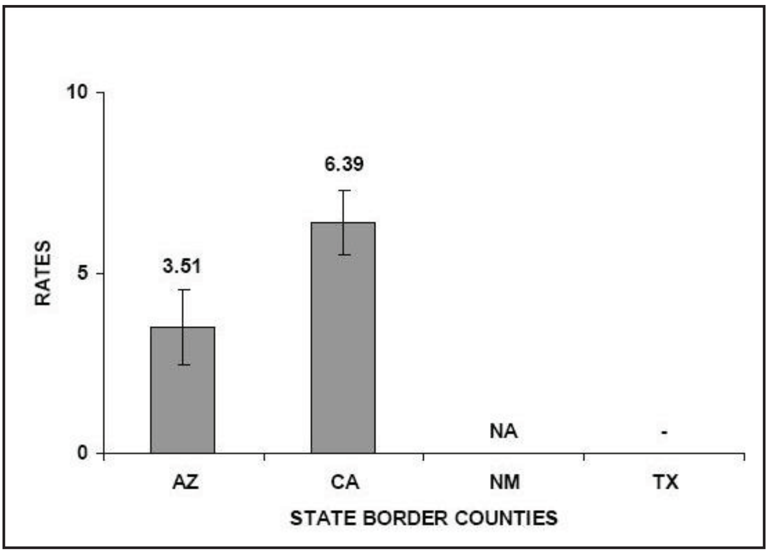

Figure 6: **Crude rates of Giardiasis (per 100,000) by border county, 2003**

Listeriosis

Listeriosis is caused by the bacterium Listeria monocytogenes. Persons may become infected by eating contaminated foods. Typical sources are vegetables, raw meats, cold cuts, unpasteurized food products and some ready-to-eat items. Symptoms include fever, muscle aches, or gastrointestinal symptoms (e.g., nausea or diarrhea). If infection has spread to the nervous system, individuals may experience headache, stiff neck, confusion, loss of balance or convulsions. Pregnant women may experience symptoms similar to a mild, flu-like illness; miscarriage, stillbirth, premature delivery, or infection of the newborn may result. Some populations (e.g., elderly, immunocompromised persons, pregnant women, newborns) are at higher risk for infection. Application of proper food handling techniques can prevent listeriosis.

A blood or spinal fluid test (to cultivate the bacteria) can detect listeria bacteria in pregnant women, though consultation with a health care provider is critical. Infected pregnant women and infants may be treated with antibiotics. Consumption of unpasteurized soft cheeses has been associated with listeriosis outbreaks among Mexican-origin population in border states and across the United States (Linnan et al., 1998; Kinde et al., 2007; MacDonald et al., 2005).

Data show that, in 2003, listeriosis was a low prevalence condition nationally and in all border states. Furthermore, there was no difference between the national rate and those of California and Texas (all below 1 per 100,000). **Figure 7** shows listeriosis rates in the United States and border states.

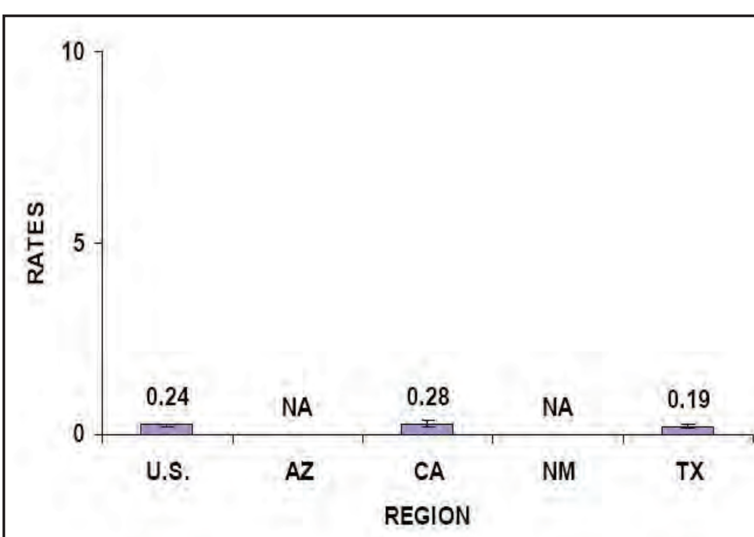

Figure 7: **Crude rates of Listerosis (per 100,000) by region, 2003**

Salmonellosis

Salmonellosis is an infection caused by a type of bacteria called Salmonella. Symptoms include diarrhea, fever, and abdominal cramps 12 to 72 hours after infection. Symptoms may last four to seven days; most persons recover without treatment. If the infection has spread from the intestines to the blood stream or other body sites, death may result unless the person is treated promptly with antibiotics. The elderly, infants, and those with impaired immune systems are more likely to experience severe illness. Analyses of stools can identify salmonellosis. A small number of infected persons may develop Reiter's Syndrome, which is characterized by joint pain, irritation of the eyes and painful urination. Reiter's Syndrome may last for months or years and can lead to chronic arthritis.

Consuming contaminated foods, which are often of animal origin (e.g., beef, poultry, milk, or eggs) may result in salmonellosis; however, all foods may become contaminated. Food may also become contaminated by the unwashed hands of an infected food handler. Salmonella may be found in the feces of some pets, especially reptiles. People can become infected if they do not wash their hands after contact with infected feces. To prevent salmonellosis, people should avoid consuming raw or undercooked eggs, poultry, or meat, and produce should be thoroughly washed before it is consumed. Thorough cooking kills Salmonella. Cross-contamination of foods should be avoided. Hands, cutting boards, counters, knives, and other utensils should be washed thoroughly after handling uncooked foods. Hands should be washed before handling any food and between handling different food items. People who have salmonellosis should not prepare food or pour water for others until they have been shown to no longer be carrying the Salmonella bacterium.

In 2003, rates of salmonellosis were fairly similar throughout the border states and to the national rate (15.01 per 100,000), as depicted in **Figure 8**. Only California displayed a significantly lower rate (11.64 per 100,000).

Figure 9 shows rates of salmonellosis incidence in the border counties. California border counties appeared to have a rate of salmonellosis above the state rate (15.03 vs. 11.64 per 100,000). New Mexico border counties also had a lower rate than the overall state rate (11.30 vs. 16.18 per 100,000).

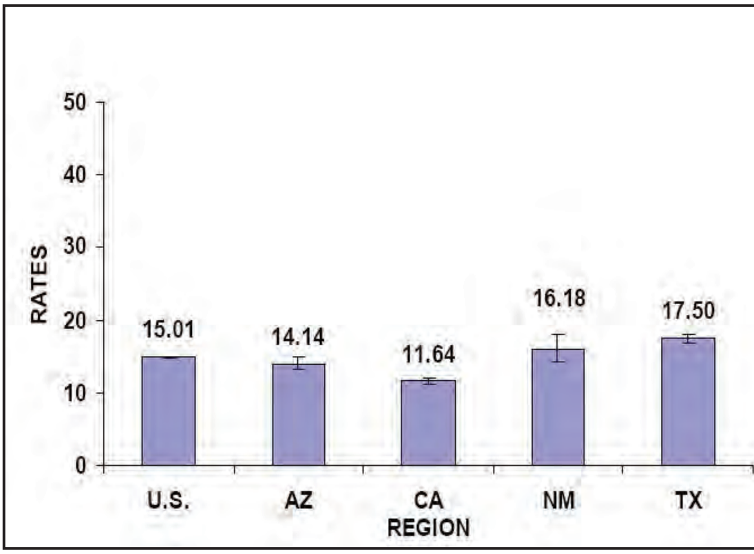

Figure 8: **Rates of Salmonellosis by region, 2003**

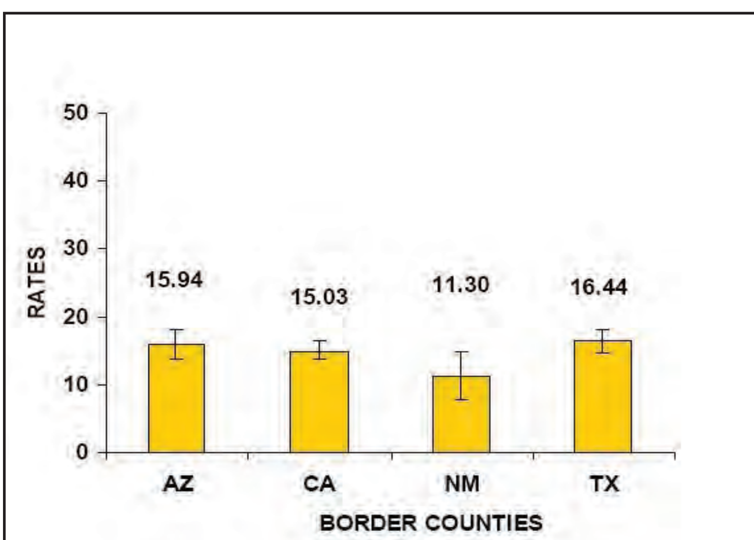

Figure 9: **Rates of Salmonellosis, border counties, 2003**

Shigellosis

Shigellosis is caused by a group of bacteria called Shigella. Symptoms of shigellosis include (bloody) diarrhea, fever, and stomach cramps. Shigellosis usually resolves in five to seven days. Young children and the elderly with severe diarrhea may be hospitalized. Children less than two years of age with high fever may experience seizures. Some infected persons may lack symptoms but may nevertheless transmit Shigella bacteria. A laboratory analysis of stool samples can determine whether a person has been infected. Antibiotic treatments can also be administered depending on the type of Shigella, though some bacteria have become antibiotic resistant. Persons with mild infections often recover quickly without antibiotic treatment. When many persons in a community are infected, antibiotics may be used selectively to treat only the more severe cases. Antidiarrheal medications, such as antimotility drugs, may make the illness worse and should be avoided.

Persons who experience diarrhea due to Shigella infection usually recover completely, although it may be several months before their bowel habits are entirely normal. About three percent of persons who are infected with Shigella flexneri may develop Reiter's Syndrome, which is characterized by joint pain, irritation of the eyes, and painful urination. Reiter's Syndrome may last for months or years and can lead to chronic arthritis. Infected persons are unlikely to become reinfected with that specific type of Shigella for at least several years.

No vaccine can prevent shigellosis, though its transmission can be stopped by frequent and careful handwashing with soap. Infected individuals should not prepare food or pour water for others until they have been shown to no longer be carrying the Shigella bacterium. Basic food safety precautions and regular drinking water treatment prevents shigellosis. At swimming beaches, having a sufficient number of bathrooms near the swimming area helps keep the water from becoming contaminated.

As **Figure 10** shows, the 2003 national crude rate of shigellosis was 8.11 per

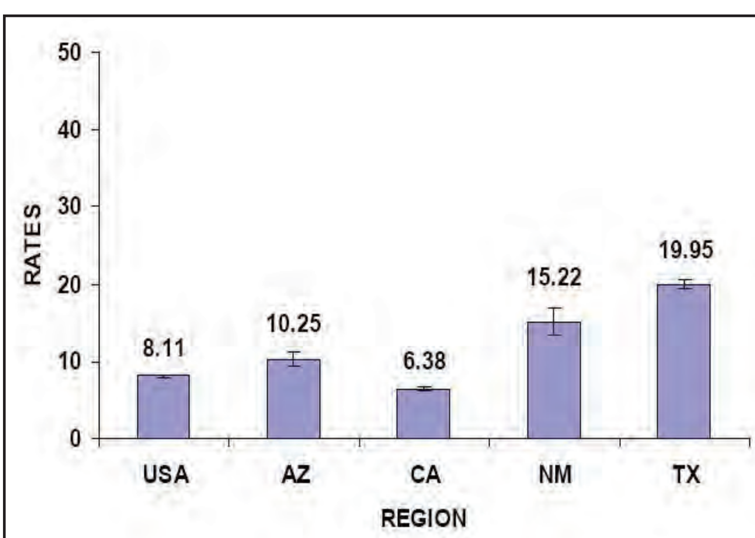

Figure 10: **Crude rates of Shigellosis (per 100,000) by region, 2003**

100,000 persons. Arizona (10.25), New Mexico (15.22), and Texas (19.95) all had higher crude rates of the condition. California had a lower rate than the national average (6.38 versus 8.11).

Figure 11 depicts data for border counties, which indicate that New Mexico and Texas experienced high rates of shigellosis in 2003 (23.86 and 18.82 per 100,000 persons, respectively.

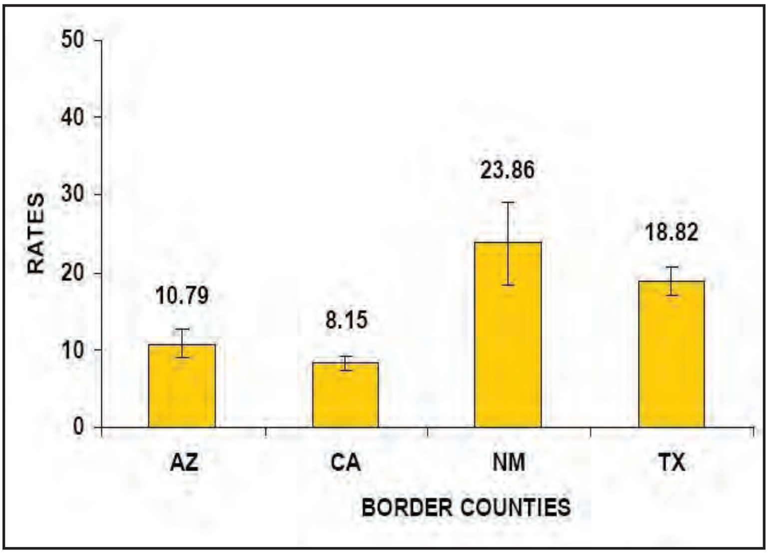

Figure 11: **Crude rates of Shigellosis (per 100,000) by border county, 2003**

Typhoid fever

Typhoid fever is caused by the bacterium Salmonella Typhi (S. Typhi), which lives only in humans and may be fatal. About 400 cases of typhoid fever occur each year in the United States; approximately 75 percent of infections are acquired while traveling internationally, especially in developing countries. Typhoid fever is more common in areas where hand-washing is less frequent and water is likely to be contaminated with sewage. Vaccinations against typhoid are available to persons traveling to areas where it is prevalent.

Infection may occur after consuming food that has been contaminated by an individual who is actively shedding S. Typhi. Once S. Typhi bacteria are consumed, they multiply and spread into the bloodstream. Upon infection, symptoms include a sustained high fever (up to 103° to 104° F, or 39° to 40° C), weakness, stomach pains, headache, loss of appetite and, less commonly, a rash of flat, rose-colored spots. Infection is confirmed by laboratory analyses of stool or blood samples.

Persons with typhoid fever carry the bacteria in their bloodstream and intestinal tract. Some people become "carriers," that is, they recover from the illness but continue to carry the bacteria. The illness may recur in carriers and carriers can also transmit S. Typhi to others. Both ill persons and carriers shed S. Typhi in their feces. Infected persons may be barred from working, especially if they are employed in food-handling or child-care positions, until the infection has resolved.

In 2003, typhoid fever was observed to be a low prevalence condition nationally (rate: 0.12 per 100,000). **Figure 12** shows crude rates of typhoid fever by region during that year. Of border states, California displayed the highest rate (0.26 per 100,000); it was significantly higher than the national rate for typhoid.

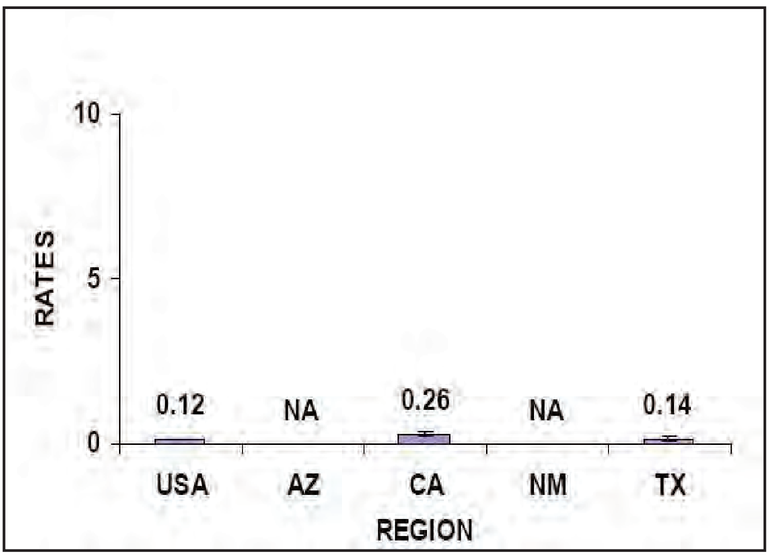

Figure 12: **Crude rates of Typhoid (per 100,000) by region, 2003**

Other Infectious Diseases

Many infectious diseases are neither foodborne or waterborne, nor sexually transmitted. Some infections are blood-borne, while others are airborne and may stem from environmental or human vectors. Some of the conditions reported on in this section include meningococcal disease, streptococcal disease and tuberculosis (TB).

Even among infectious diseases, TB represents a grave concern. Converging factors contribute to elevated TB incidence and complicate TB control efforts along the U.S.-Mexico border. Mexico exhibits a higher TB rate than does the United States, and the migratory flow across the border results in elevated TB incidence in the geographic areas most affected by cross-border migration flows. Low socioeconomic status, crowded living conditions, and limited access to health care increase the risk for TB transmission on both sides of the border.

An analysis of tuberculosis case reports in the United States from 1993-2001 found that the TB rates for Mexican-born patients were five times or more higher than for U.S.-born persons. This was true both in border states and non-border states. TB rates were higher for Mexican-and U.S.-born patients residing in the 23 counties contiguous to the U.S.-Mexico border (Schneider, Laserson, Wells, & Moore, 2004). The high cross-border mobility of TB patients in the border region is a barrier for public health follow-up and completion of treatment and is one important factor associated with increasing drug resistance. Both multi-drug resistant and extensively-drug resistant TB have been diagnosed in the border region.

Coccidiodomycosis

Coccidiodomycosis is caused by inhalation of the fungus Coccidioides immitis, which is found in the soil. This condition is also commonly known as valley fever. The disease is endemic only in regions of the Western Hemisphere. In the United States, affected areas include southern Arizona, central California, southern New Mexico, and west Texas. Outbreaks may occur following dust storms, earthquakes, earth excavation, and other activities that disperse the fungus. An acute respiratory infection occurs 7 to 21 days after exposure and typically resolves rapidly. Infected persons may experience a flu-like illness with fever, cough, headaches, rash and myalgias. Some patients may develop chronic pulmonary infection or widespread disseminated infection that affects the meninges, soft tissues, joints and bones. Severe pulmonary disease may develop in HIV-infected persons and persons with other immunocompromising medical conditions. Infected persons may develop meningitis, and some may develop permanent neurological damage.

In both the United States (rate: 1.67 per 100,000) and most of the border states, Coccidioides immitis infection was a low prevalence condition in 2003. As expected, Arizona experienced the highest rate of the illness (48.30 per 100,000), followed by California (5.90 per 100,000). **Figure 13** shows Coccidioides immitis infection rates by region.

As **Figure 14** shows, Arizona and California border counties fared slightly better than their respective states: they had lower rates of Coccidioides immitis infection (38.33 and 1.86 per 100,000, respectively).

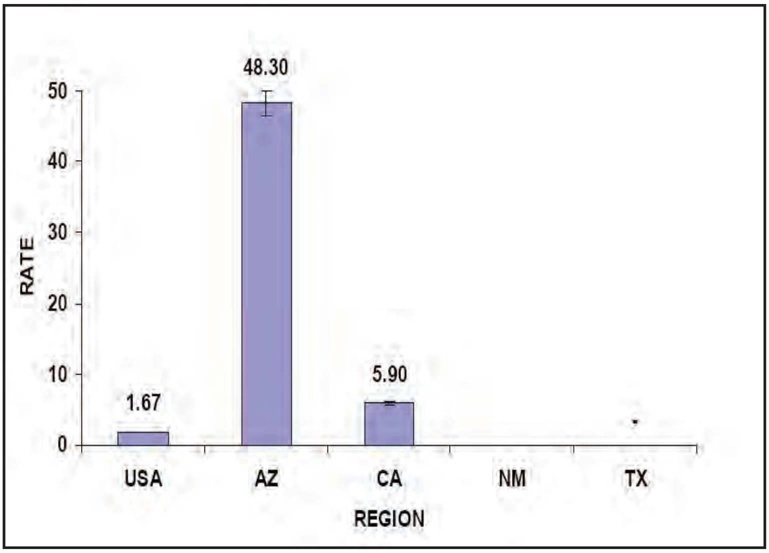

Figure 13: **Crude rates of Coccidioidomycosis (per 100,000) by region, 2003**

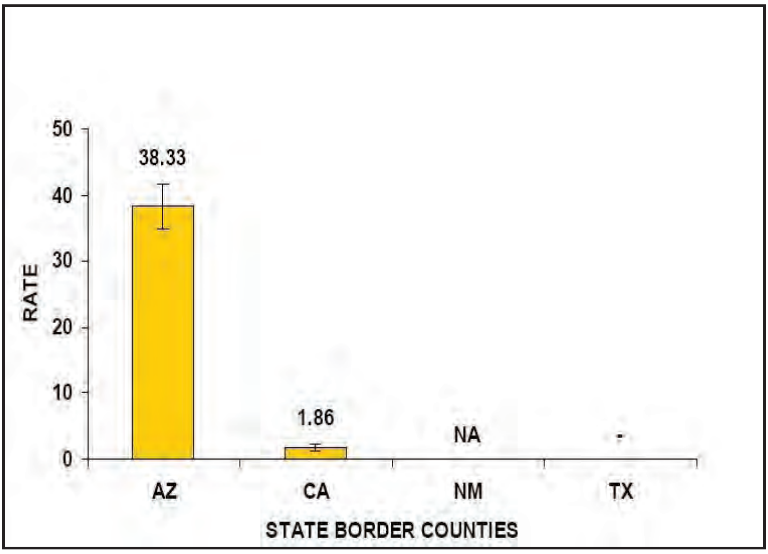

Figure 14: **Crude rates of Coccidioidomycosis (per 100,000) by border county, 2003**

Haemophilus Influenzae

Haemophilus influenzae is a small, gram-negative bacterium. Several subtypes of H influenzae cause infections in humans. Of those subtypes, H influenzae serotype b is the most virulent. H influenzae serotype b causes about 95 percent of H influenzae invasive diseases in children, and more than half of invasive diseases in adults (Bisgard, Bath, Srivastava, & Cortese, 2002). Infection can occur when individuals come into direct contact with droplets from nasopharyngeal carriers or case patients. Prior to the development of the H influenzae b conjugate vaccine, more than one-half of infected persons presented as meningitis with fever, headache, and stiff neck; others presented as cellulitis, arthritis, or sepsis. Between three and six percent of cases are fatal, and up to 20 percent of surviving patients have permanent hearing loss or other long-term health effects.

Regular use of the vaccine in the United States has lowered the incidence of this condition. In 2003, the national crude rate of H influenzae infections was 0.69 per 100,000 (see **Figure 15**). The crude rate of this condition for California was significantly lower (0.17) than the national rate, while Arizona appeared to have a significantly higher rate (1.67). The rate for New Mexico appeared to be higher than the national rate, though not significantly different (1.28).

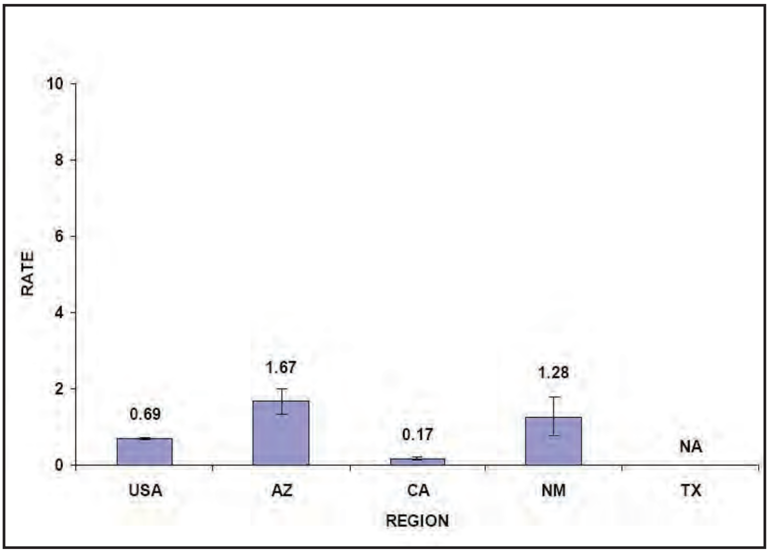

Figure 15: **Crude rates of Haemophilus influenzae (Per 100,000) by region, 2003**

Hepatitis B. v Acute

Hepatitis B is caused by the hepatitis B virus. About 30 percent of infected persons have no signs or symptoms of infection. Adults are more likely than children to present symptoms such as jaundice, fatigue, abdominal pain, loss of appetite, nausea, vomiting or joint pain. Persons who acquire infection perinatally or in childhood are more likely to develop chronic infection. Long-term consequences of hepatitis B infection include cirrhosis of the liver, liver cancer, liver failure or death. Hepatitis B-infected persons should be evaluated by their doctor for liver disease.

The virus is transmitted when blood from an infected person enters the body of an uninfected person. Activities that raise the risk of exposure include sexual intercourse without a condom, sharing of drugs or needles, or obtaining tattoos or body piercings from a vendor who does not follow appropriate sterilization or safe blood/body fluid practices. The virus can also pass from mother to infant during childbirth. Health care providers are also at risk via needlesticks or sharps exposures.

The hepatitis B vaccine is available to protect against the virus and can reduce hepatitis B transmission and related liver disease. Children in the United States are vaccinated against hepatitis B virus as part of routine childhood vaccinations. Vaccinations against both hepatitis A and B are recommended, especially for health-care and safety workers. Correct use of latex condoms during each sexual activity by persons with multiple sex partners is important. Pregnant women should get tested for the virus. Infants born to infected women should be vaccinated against the virus within 12 hours after birth. Drug users who share needles, syringes, or water are at high risk of contracting the virus. Sharing personal items that may have blood on them, such as razors or toothbrushes, is another risky practice. Persons who have ever been infected with hepatitis B should not donate blood, organs, or tissues.

The Healthy Border 2010 objective for the United States for hepatitis B is to reduce the incidence rate by 50 percent from 2.2 to 1.1 per 100,000 inhabitants (BHC, 2003a). The borderwide hepatitis B incidence rate in 2003 was 1.6, equivalent to 60 percent of the 2010 objective. The national crude rate of hepatitis B in 2003 was 2.59, as shown in **Figure 16**. Of border states,

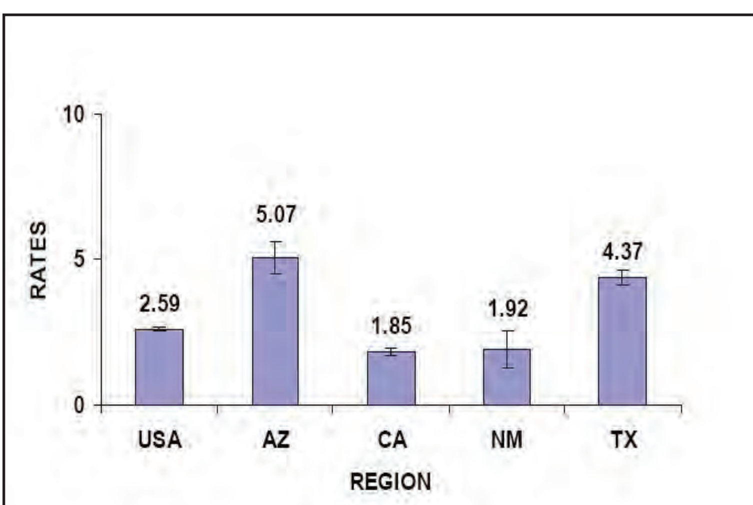

Figure 16: **Crude rates of Hepatitis B. v Acute (per 100,000) by region, 2003**

Arizona (5.07) and Texas (4.37) reported the highest crude rates while rates for California(1.85) and New Mexico (1.92) were lower than the national rate and those of Arizona and Texas.

Figure 17 shows hepatitis B rates in border counties. Arizona border counties displayed the highest crude rate (4.33). This rate was notably higher than both national and border-wide rates. In contrast, the Texas border counties' rate of hepatitis B was 1.63 per 100,000 — significantly lower than the state rate (4.37; Figure 16) and was near the Healthy Border 2010 objective.

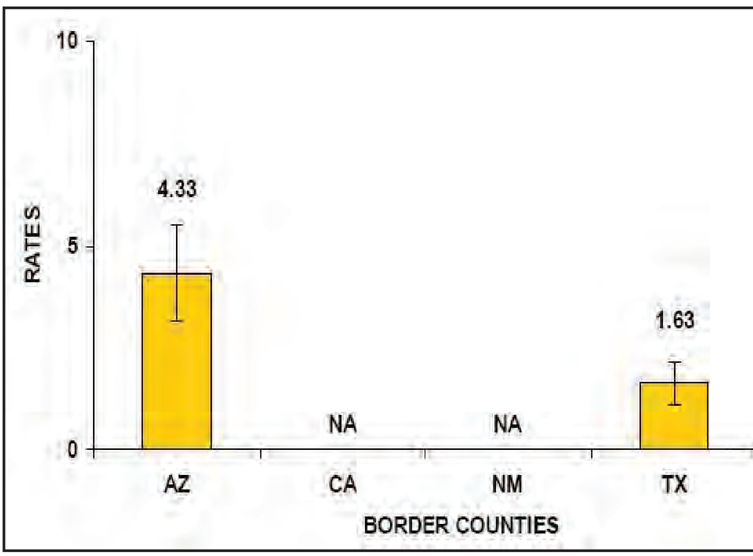

Figure 17: **Crude rates of Hepatitis B. v Acute (per 100,000) by border county, 2003**

Hepatitis C. v Acute

Hepatitis C is caused by the hepatitis C virus. Approximately 80 percent of infected persons do not show signs or symptoms of infection. When signs and symptoms do appear, they may include jaundice, fatigue, dark urine, abdominal pain, loss of appetite and nausea. The hepatitis C virus causes chronic infection and chronic liver disease. Some infected persons may die as a result of chronic liver disease.

As with hepatitis B, the hepatitis C virus may be spread when blood of an infected person enters the body of an uninfected person, such as in activities that involve sharing needles, during childbirth, and in needlesticks among health-care professionals. Persons at risk for hepatitis C infection may also be at risk for infection with hepatitis B virus and HIV. Testing for hepatitis C virus is recommended for persons at risk for the infection, including injection drug users, some recipients of blood or solid organs, infants of infected mothers, health care and public safety workers and others.

No vaccine is currently available to prevent hepatitis C infection. Infected persons may be treated with certain drugs. Treatment may slow or stop the progression of disease but does not eliminate the virus. However, several precautions can be taken to prevent infection. Abstention from injection drug use is a primary precaution. Drug users should not share needles, syringes, or water. Vaccination against hepatitis A and B is recommended. Personal items that may have blood, such as razors or toothbrushes, should not be shared. Blood and body fluid safety practices of tattoo or body piercing artists should be considered. Persons who are infected with hepatitis C should not donate blood, organs, or tissue.

As **Figure 18** shows, crude rates of hepatitis C in 2003 were low, below 1 per 100,000, nationally and in border states. Of border states, Texas displayed the highest rate at 0.23 per 100,000.

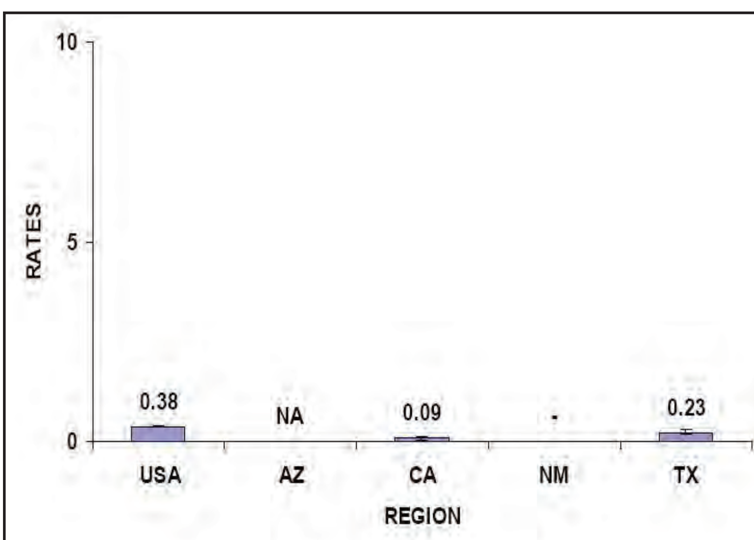

Figure 18: **Crude rates of Hepatitis C. v Acute (per 100,000) by region, 2003**

Meningococcal disease

Meningococcal disease, also known as meningitis or spinal meningitis, is an infection of the fluid of a person's spinal cord and the fluid surrounding the brain. The condition may be caused by a viral or bacterial infection. Distinguishing between the two sources is important, because the source affects the severity of the illness and treatment options. Viral meningitis may resolve without specific treatment, whereas bacterial meningitis is more severe and may result in brain damage, hearing loss and learning disabilities. In addition, the bacteria type should be identified because some antibiotic treatments may reduce transmission. Prior to the 1990s, Haemophilus influenzae type b was the leading cause of bacterial meningitis. Today, most cases of bacterial meningitis are caused by Streptococcus pneumoniae and Neisseria meningitidis. Signs and symptoms include high fever, headache, stiff neck, nausea, vomiting, discomfort looking into bright lights, confusion, and sleepiness in persons ages two and older. They may develop over several hours, or they may take one to two days to develop. In newborns and small infants, the classic symptoms of fever, headache, and neck stiffness may be absent or difficult to detect. The infant may appear slow or inactive, irritated, and be vomiting or feeding poorly. As the disease progresses, patients of any age may have seizures.

Early diagnosis and treatment of meningitis are very important, and a physician should be consulted immediately if meningitis is suspected. The diagnosis is usually made by growing bacteria from a sample of spinal fluid obtained during a spinal tap. Bacterial meningitis can be treated with a number of effective antibiotics. Treatment should begin early in the course of the disease. Some forms of bacterial meningitis are contagious, and bacteria may be transmitted through the exchange of respiratory and throat secretions (for example, coughing or kissing). People who are in close contact with a person who has meningitis caused by Neisseria meningitidis should receive antibiotics to prevent acquisition of the disease. Safe and highly effective vaccines are available against Hemophilus influenzae b, some serogroups of Neisseria meningitides, and many types of Streptococcus pneumoniae. Vaccination against H. influenzae and N. meningitides is part of routine childhood vaccination in the United States. Overseas travelers should check to see if meningococcal vaccine is recommended for their destination and should receive the vaccine at least one week before departure, if possible.

In 2003, the crude rate for meningococcal disease was below 1 per 100,000 in the United States and in all border states (**Figure 19**).

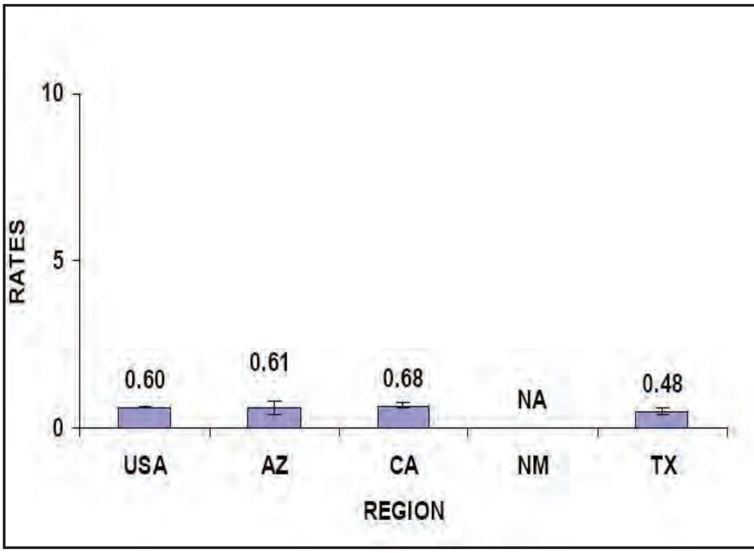

Figure 19: **Crude rates of Meningococcal Disease (per 100,000) by region, 2003**

Pertussis

Pertussis is caused by the Bordetella pertussis bacterium. It is a highly communicable, vaccine-preventable disease lasting many weeks. Children typically present with paroxysmal spasms of severe coughing, whooping, and posttussive vomiting. Major complications are most common among infants and young children and include hypoxia, apnea, pneumonia, seizures, encephalopathy, malnutrition and death. Most deaths occur among the unvaccinated or children too young to be vaccinated. Infection occurs through direct contact with discharges from respiratory mucous membranes of infected persons. Children who are too young to be fully vaccinated and those who have not completed the primary vaccination series are at highest risk for severe illness.

Figure 20 depicts national and border state crude rates for pertussis in 2003. The national crude rate for pertussis was 4.01 per 100,000. Though there was variation, border states did not appear to differ significantly from this rate.

Figure 21 shows crude rates of pertussis in the border region. California border counties' crude rate of pertussis appeared higher than the state rate (5.15 per 100,000 versus 3.54, respectively). In contrast, Texas border counties' rate was lower than the state rate (2.29 per 100,000 versus 3.03, respectively).

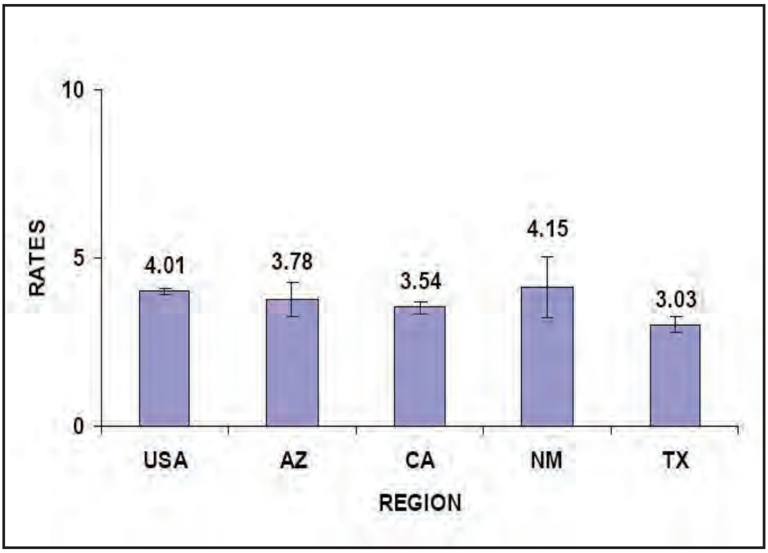

Figure 20: **Crude rates of Pertussis (per 100,000) by region, 2003**

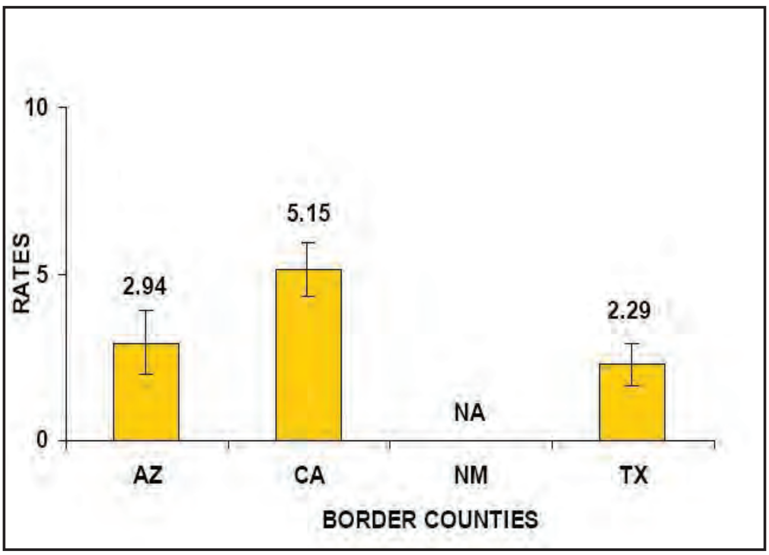

Figure 21: **Crude rates of Pertussis (per 100,000) by border county, 2003**

Streptococcal Disease, Invasive Group A

Group A Streptococcus (GAS) is a bacterium often found in the throat or on the skin. The bacteria are transmitted through direct contact with mucus from the nose or throat of infected persons or through contact with infected wounds or sores on the skin. People may carry the bacterium without showing symptoms.

Most GAS infections result in mild illnesses such as “strep throat” or impetigo. Severe or life-threatening diseases such as necrotizing fasciitis or streptococcal toxic shock syndrome emerge less frequently. Appropriate antibiotic treatments generally eliminate transmission of the bacteria. Although healthy individuals can get invasive GAS disease, people with chronic illnesses like cancer, diabetes, and kidney dialysis, and those who use medications such as steroids, are at higher risk of infection and complications. Early treatment may reduce the risk of death from invasive GAS, though it may not always be preventable. Individuals with very severe illness may require intensive care. Individuals with necrotizing fasciitis may require surgery to remove damaged tissue. Transmission of GAS infection can be reduced by thorough hand washing, especially after coughing and sneezing and before preparing foods or eating.

Persons with sore throats should be evaluated to determine whether the illness is strep throat. Persons with strep throat should stay home from work, school, or day care until 24 hours after starting antibiotic treatment. All wounds should be kept clean and monitored for signs of infection such as redness, swelling, drainage, and pain at the wound site. Individuals with signs of an infected wound, especially fevers, should seek medical care.

Nationally, the crude rate of GAS infection was 2.02 per 100,000 persons in 2003 (**Figure 22**); higher crude rates were evident in Arizona and New Mexico (4.64 and 6.76, respectively) whereas California’s and Texas’ crude rates were below the national rate (1.21 and 0.94, respectively).

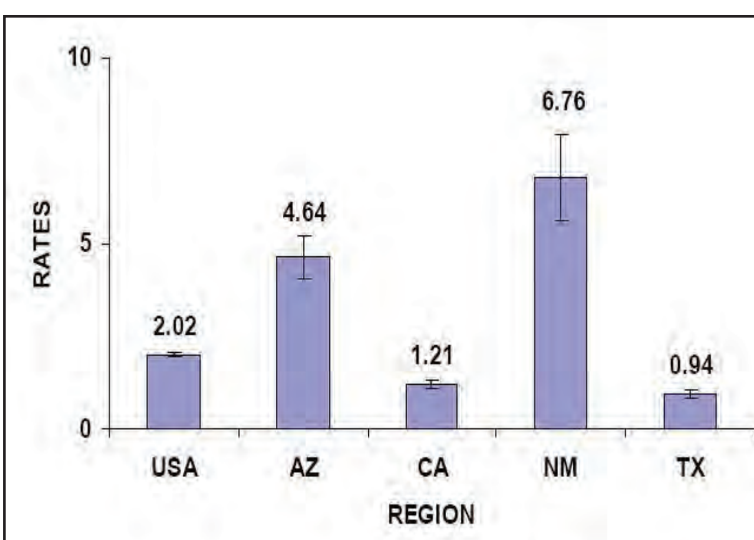

Figure 22: **Crude rates of Streptococcal Disease, Inv. Group A (per 100,000) by region, 2003**

Of border counties, California had a crude rate (5.41) above the state and national rates, as shown in **Figure 23**. The crude rate for Arizona border counties (4.25) exceeded the national rate but was similar to the Arizona state rate.

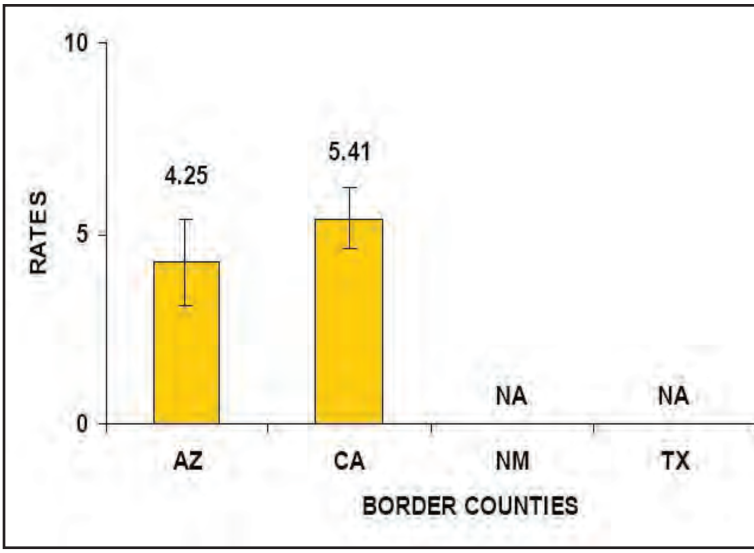

Figure 23: **Crude rates of Streptococcal Disease, Inv. Group A (per 100,000) by border county, 2003**

Streptococcus Pneumoniae, Invasive Disease

Streptococcus pneumoniae is caused by a bacterium, of which more than 90 serotypes exist. Streptococcus pneumoniae is transmitted from person to person. Death occurs in 14 percent of hospitalized adults with invasive disease. Neurological sequelae and/or learning disabilities can occur in meningitis patients. Hearing impairment can result from recurrent otitis media. Persons at higher risk for infection are the elderly, children less than two years old, blacks, American Indians and Alaska Natives, children who attend group day care centers, and persons with underlying medical conditions (such as HIV infection or sickle-cell disease). Although a vaccine is available, supplies of pneumococcal conjugate vaccine are inadequate and the 23-valent polysaccharide vaccine is underused. Sensitive, rapid diagnostic tests are not available for many types of pneumococcal infections, although a new urinary antigen test may be useful in adults. Widespread overuse of antibiotics contributes to emerging drug resistance.

Figure 24 shows that Streptococcus pneumoniae had a low national crude rate in 2003 of 0.88 per 100,000. However, New Mexico displayed a high rate at 9.79.

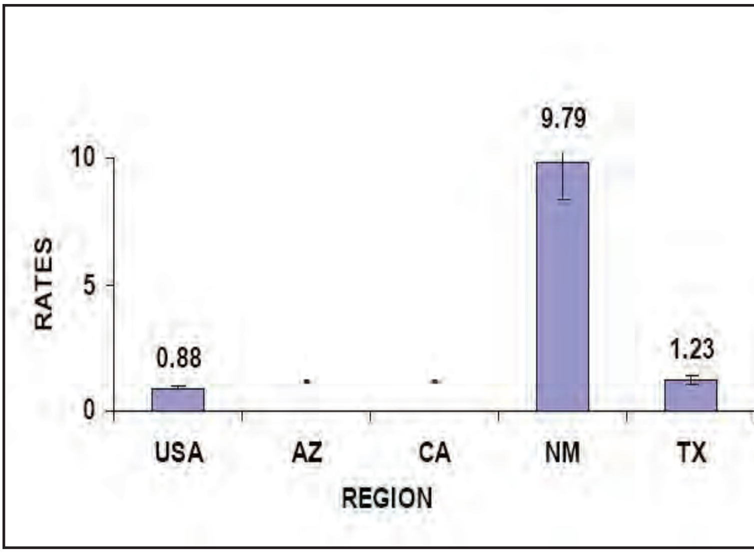

Figure 24: **Crude rates of Streptococcus Pneumoniae, Inv. Disease (per 100,000) by region, 2003**

Tuberculosis

Tuberculosis (TB) is an airborne infection caused by mycobacterium tuberculosis. TB typically affects the lungs, though other areas may also be affected (for example, brain, kidneys or spine). Symptoms of infection include feeling sick or weak, weight loss, fever, night sweats, coughing, chest pain and coughing up blood. Other symptoms depend on the body part affected. Tuberculosis is transmitted when the bacteria are airborne (because of coughing, sneezing, speaking, or singing). Persons who inhale the bacteria may become infected and may have a latent TB infection. That is, they may be infected but do not show symptoms because the bacteria are not active. Their risk of transmitting the bacteria to others is low. Nevertheless, persons with a latent infection may be prescribed an appropriate treatment to prevent them from developing active TB disease. Individuals with active TB can transmit the bacteria to others, especially family or coworkers, and should be treated promptly and appropriately.

Individuals who have been exposed to TB should get tested by their physician or local health department to determine infection and they should be treated as necessary. Treatment for TB involves a multi-drug regimen, typically lasting six months. It is important to adhere to the treatment guidelines and to complete the regimen, as failure to do so may result in drug resistance, a situation which is more difficult and costly to treat. Rates of drug resistance have been shown to be high among Mexican-born pulmonary tuberculosis patients residing in the border states (Schneider et al., 2004). Although hampered by limited resources, several U.S. programs in the border region successfully collaborate with Mexican agencies in TB case-finding, follow-up, and continuity of care, focusing on patients traveling across the border.

The Healthy Border 2010 objective for the United States for TB is to reduce the incidence rate by 50 percent from 10.0 to 5.0 per 100,000 inhabitants (BHC, 2003a). However, since the year 2000 the border incidence rate for TB has not changed significantly. The incidence rate in 2003 was 10.3.

Figure 25 illustrates national and border-state crude rates of TB incidence in 2003. Nationally, the crude rate of TB was 5.12 per 100,00 in 2003. This rate was exceeded by Arizona (26.81), California (9.10) and Texas (7.30). Notably, New Mexico's crude rate of TB was 2.61, below the national rate and that of other border states.

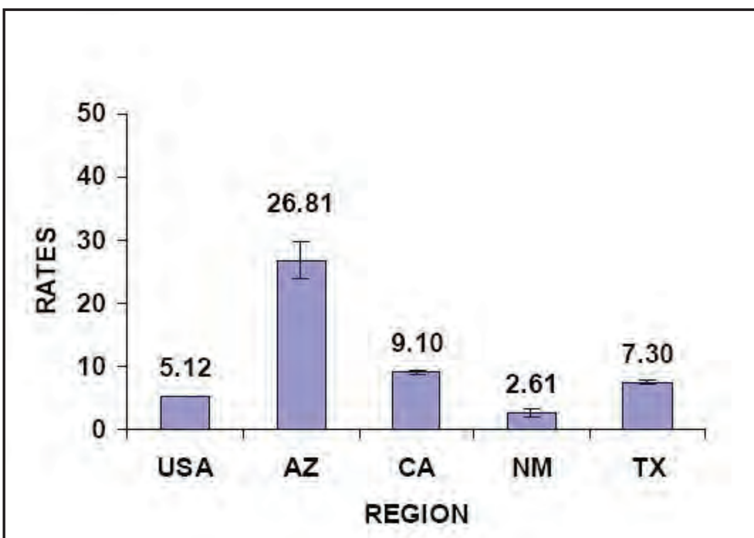

Figure 25: **Rates of Tuberculosis by region, 2003**

Figure 26 shows crude rates of TB incidence in the U.S.-Mexico border region. In 2003, California and Texas border counties had high rates of TB (11.12 and 12.87, respectively).

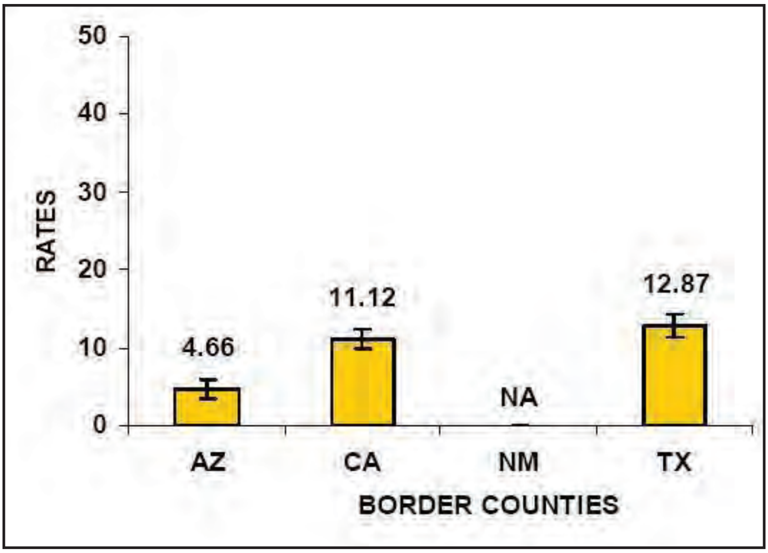

Figure 26: **Crude rates of Tuberculosis (per 100,000) by region, 2003**

Sexually Transmitted Diseases (STDs)

Like other infectious diseases, sexually transmitted diseases (STDs) have important physical, psychological, and economic costs for infected persons, families, and payers of medical services. The burden of STDs is especially high for younger persons (ages 15-24 years). All too often, STDs are undiagnosed (Centers for Disease Control [CDC], 2006). Populations that lack health insurance or are otherwise marginalized because of their immigration or economic status may not receive timely or adequate attention. Factors that increase the risk of acquiring a sexually transmitted disease include engaging in unprotected sex, having multiple partners, and increased drug and alcohol use. All of these risk factors have been identified in Mexican migrant populations (Sanchez et al., 2004).

STDs also pose a health risk to pregnant women and their fetuses (CDC, 2004). Potential consequences of STD infection in pregnant women include early onset of labor, rupture of the membranes surrounding the baby in the uterus, and uterine infection after delivery. STDs may result in a stillbirth, low-birth weight infant, eye or respiratory infections, or other neurological effects. The infant may also become infected during childbirth. Therefore, it is recommended that women receive regular prenatal care and screening for any STDs (CDC, 2004). This section examines border states' and counties' experiences with chlamydia, gonorrhea, and syphilis as well as HIV/AIDS.

Although the Joint United Nations Program on HIV/AIDS categorizes both Mexico and the United States as "low prevalence" countries for HIV/AIDS, aggregate national figures mask the epidemics of HIV/AIDS and STDs in the U.S.-Mexico border region. Dense social networks, characterized by high-risk sexual behaviors and relationships between individuals, straddle both sides of the border and fuel the emergence of these epidemics. These networks include the commercial sex industry in major urban border areas, supported by clients from the United States and Mexico who also have sex with their primary or regular partners on either side of the border (Brouwer et al., 2006; Rangel et al., 2006). Clients include Mexican and other Latin-American migrants who are not necessarily disease carriers, but whose migration conditions and experiences (e.g., social isolation, limited health care access, etc.) increase their vulnerability to HIV and STDs (Fosados, Cabellero-Hoyos, Torres-Lopex, & Valente, 2006; Hirsch, Higgens, Bentley, & Nathanson, 2002). For example, STD transmission is associated with high rates of unprotected sex with casual partners among Mexican migrant men in the San Diego/Tijuana border area (Rangel et al., 2006).

The overlap of sexual and injection drug use networks has exacerbated the HIV and STD epidemics in the U.S.-Mexico border region. The commercial sex industry involves some workers who are injection drug users and have sex for money and/or supplies to support their drug consumption. This is part of the market created by the "spillover" of drug trafficking from Latin America to the United States via the border region (Brouwer et al., 2006; Frost et al., 2006; Saavedra, 2007). For example, in one study in the El Paso/Ciudad Juárez border area, more than half of female sex workers interviewed reported injecting drugs (Frost et al., 2006). The high prevalence of syphilis among injection drug users in both the San Diego/Tijuana and El Paso/Ciudad Juárez border areas (Frost et al., 2006) may have introduced the infection into sexual networks. Because syphilis is a co-factor of HIV transmission, this introduction may have contributed to the increase of HIV seroprevalence among pregnant women in Tijuana, from 0.3 percent in 1998 to 1.1 percent in 2003. All new HIV cases were linked to injection drug use (Saavedra, 2007).

Despite difficulties caused by such factors as the stigma of HIV and STDs — and the challenges of reaching border sub-populations such as migrants, injection drug users, and others — academic research has complemented public health surveillance to determine the extent of the epidemics and the importance of observed risk factors. Intensified and related efforts to reduce stigma, provide universal access to HIV/STD services (especially testing and case management), and promote uniform binational surveillance practices will enhance the evidence base to inform appropriate disease prevention and control policies in the U.S.-Mexico border region.

Chlamydia

Chlamydia is caused by the bacterium Chlamydium trachomatis and spread through vaginal, anal, or oral sex. Chlamydia may also be transmitted by mothers to infants during vaginal childbirth. In women, the bacteria may infect the cervix, urethra, fallopian tubes, or rectum. Some infected women may not experience signs or symptoms. Others may experience symptoms such as lower abdominal pain, low back pain, nausea, fever, or painful intercourse. In men, the penis may be affected and symptoms may include penile discharge, burning sensations during urination, or other symptoms. Infected women who are untreated or undertreated may develop Pelvic Inflammatory Disease (PID), an infection of the reproductive organs. In turn, PID may lead to infertility. Women with chlamydia are also more likely to become infected with HIV if exposed.

Sexually active persons and pregnant women should be tested for this STD. In 1998, a urine-based test for chlamydia was introduced which made testing for chlamydia easier (CDC, 2002). Chlamydia can be treated and cured with antibiotics. However, underreporting of chlamydia by infected persons is pervasive since symptoms may be mild or absent. This disease has grown more prevalent since reporting was initiated in the early 1990s.

Chlamydia rates exhibit regional variation. In 2003, the crude rate for the nation was 368.54 per 100,000. Among border states, New Mexico exhibited the highest rate (454.92) followed by California (377.39). **Figure 27** shows crude rates of chlamydia for the United States and border states. Arizona had the lowest overall crude rate of the four border states (288.53) in 2003.

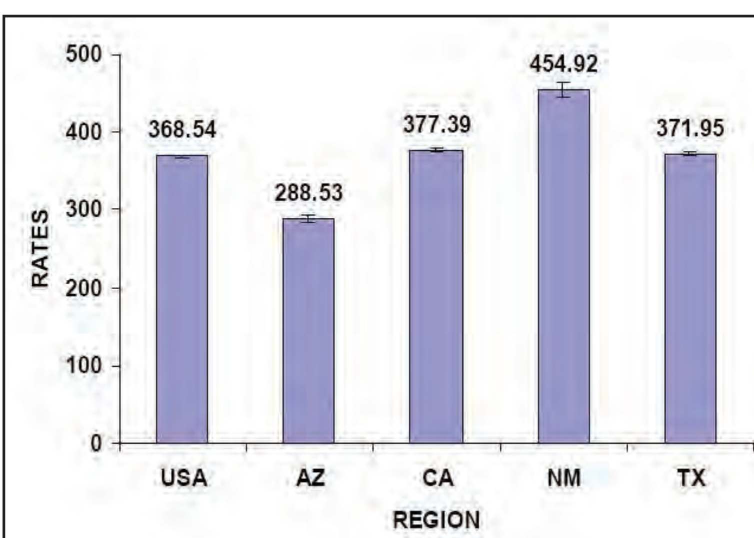

Figure 27: **Crude rates of Chlamydia (per 100,000) by region, 2003**

Analyses of border county data indicated that all border counties' rates of chlamydia were slightly below the national rate as well as those of their respective states, as depicted in **Figure 28**. California border counties stood out as having the highest crude rate of chlamydia (347.81), while Arizona border counties' rate was well below the state rate (239.88 vs. 288.53, respectively).

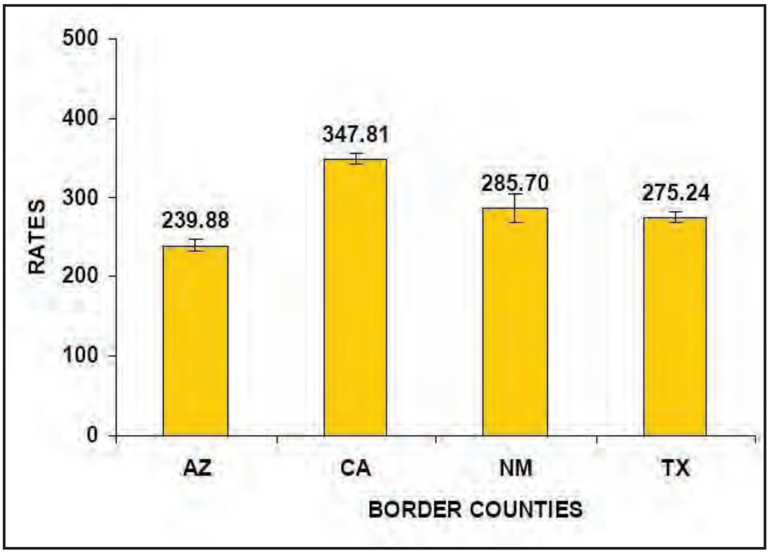

Figure 28: **Crude rates of Chlamydia (per 100,000) by border county, 2003**

Gonorrhea

The bacterium Neisseria gonorrhoeae can be transmitted through contact with the penis, vagina, mouth, or anus. Infants may become infected during vaginal childbirth. Symptoms of gonorrhea in women include painful or burning sensation during urination, increased vaginal discharge, or vaginal bleeding between menstrual cycles. Symptoms may be mild and may be mistaken for a bladder or vaginal infection.

Infected men may experience painful or swollen testicles and a burning sensation while urinating. The penis may discharge a white, yellow, or green substance. Rectal infection is also possible. In these cases, symptoms include discharge, anal itching, soreness, bleeding, or painful bowel movements. Women whose condition is untreated may experience PID and consequent infertility, and their risk of ectopic pregnancy is higher. In men, the infection may lead to epididymitis, a testicular condition that can result in infertility if untreated. Infected individuals may also contract HIV more easily if exposed.

Like other STDs, gonorrhea is frequently underreported. Generally, gonorrhea can be treated and cured by the use of antibiotics. However, the spread of drug-resistant strains is making the treatment and cure of gonorrhea difficult.

Figure 29 shows crude rates of gonorrhea both nationally and in the border states. The national crude rate of gonorrhea in the United States was 132.18 per 100,000 persons. Of the border states, only Texas exhibited a crude rate similar to the national rate (128.02); other border states had significantly lower rates of gonorrhea.

Notably, border counties also displayed rates of gonorrhea that were well below the national rate, and more significantly, the state rate.

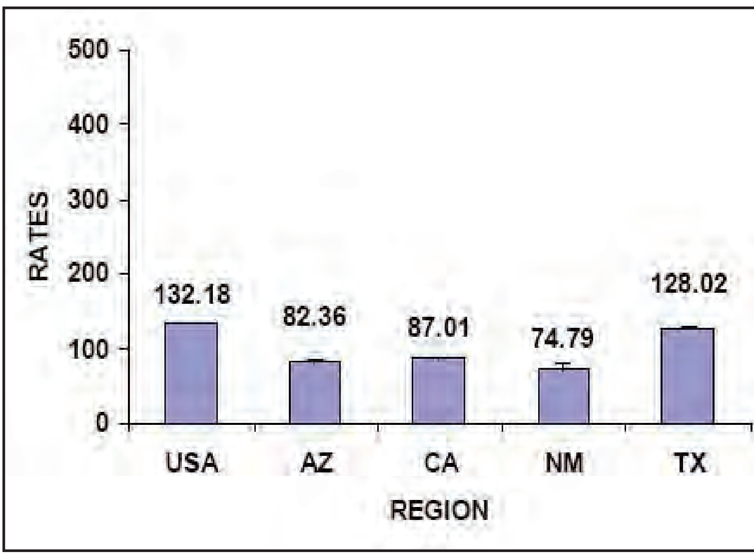

Figure 29: **Crude rates of Gonorrhea (per 100,000) by region, 2003**

Primary and Secondary Syphilis

Syphilis is caused by the bacterium Treponema pallidum; symptoms are often indistinguishable from those of many other diseases. Syphilis can be transmitted through direct contact with a syphilis sore, such as through sexual contact. Sores are found most frequently on the external genitals, vagina, anus, rectum, lips or mouth. Pregnant women may transmit syphilis to the fetus. Primary syphilis is the first stage of the disease and is characterized by the chancre lesion. Secondary syphilis follows and is characterized by the appearance of a rash in at least one area, such as on the palms of the hands or soles of the feet. Other symptoms include fever, swollen lymph glands, sore throat, patchy hair loss, headaches, weight loss, muscle aches, and fatigue. Many infected people do not have any symptoms for years and remain at risk for late complications if untreated. Infected persons in the late stages of syphilis may experience damage to internal organs (i.e., brain, nerves, eyes, heart, blood vessels, liver, bones, joints), and other symptoms include paralysis, numbness, dementia, or gradual blindness; in some cases death occurs.

Although transmission appears to occur from persons with sores who are in the primary or secondary stage, many syphilis-caused sores are unrecognized. Thus, most transmission is from persons who are unaware of their infection. The likelihood of HIV infection or transmission is greater among infected persons with genital sores. In its early stages, syphilis can be cured through the application of antibiotics; persons in later stages require a longer term application of antibiotics. Screening at-risk persons for syphilis is important given the availability of effective treatments. Primary and secondary syphilis has been declining in women but increasing among men, especially men who have sex with men (MSM).

Figure 30 shows crude rates of primary and secondary syphilis in the United States and four border states. The national crude rate of primary and secondary syphilis in 2003 was 3.44 per 100,000 persons. Of border states, Arizona (4.45) and California (5.70) displayed crude rates above the national rate.

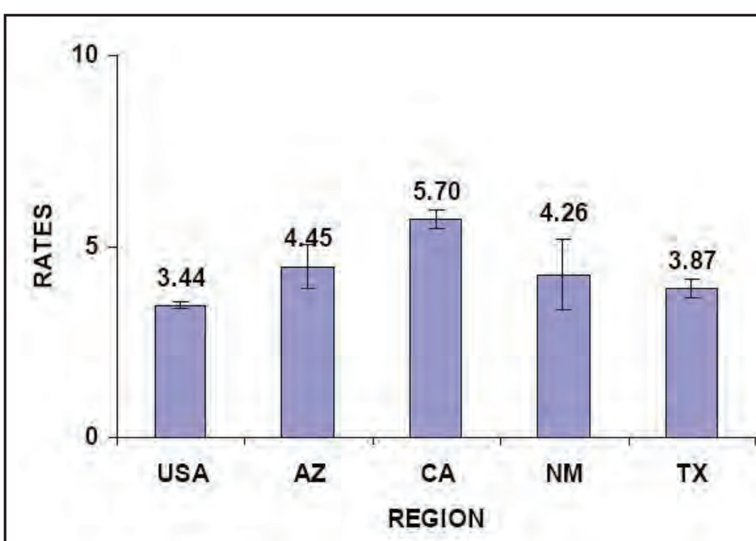

Figure 30: **Crude rates of Primary and Secondary Syphilis (per 100,000) by region, 2003**

Border county data were available for Arizona and California only and are depicted in **Figure 31**. Arizona data displayed a wide confidence interval, suggesting that there may be no statistical difference between the state and border county rates, whereas California border counties appear to have a crude rate below the state rate (3.65 per 100,000).

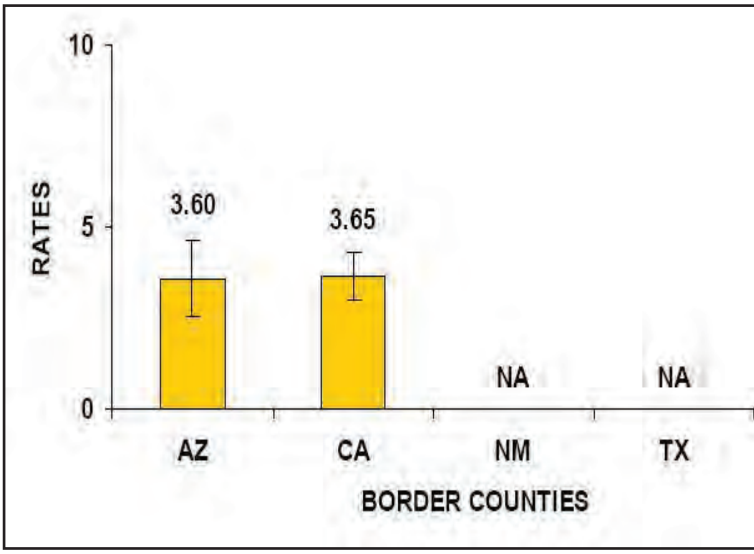

Figure 31: **Crude rates of Primary and Secondary Syphilis (per 100,000) by border county, 2003**

Congenital Syphilis

Congenital syphilis is caused by the spirochete Treponema pallidum, which can be transmitted by the mother to the fetus during development or childbirth. Pregnant women infected with syphilis may have a stillbirth or the infant may die soon after birth — particularly if untreated — due to complications (e.g., seizures, failure to thrive, saddle nose, bone pain, sores, and others). In older children syphilis may produce brain damage, blindness and other developmental delays. Treatment options depend on factors such as identification of syphilis in the mother, adequacy of maternal treatment, presence of clinical, laboratory, or radiographic evidence of syphilis in the infant, and comparison of maternal and infant notreponemal serologic titers at delivery. Children presenting with syphilis should be evaluated to determine whether it is congenital or acquired (i.e., primary and secondary syphilis, latent syphilis, due to sexual assault or abuse).

In 2003, the national crude rate for congenital syphilis was 11.42 per 100,000 live births, as depicted in **Figure 32**. Arizona displayed the highest crude rate (35.18) of all border states, although with a wide confidence interval because of the small number of cases reported. Texas was the border state with the second highest rate of congenital syphilis (21.99). Data for border counties were unavailable.

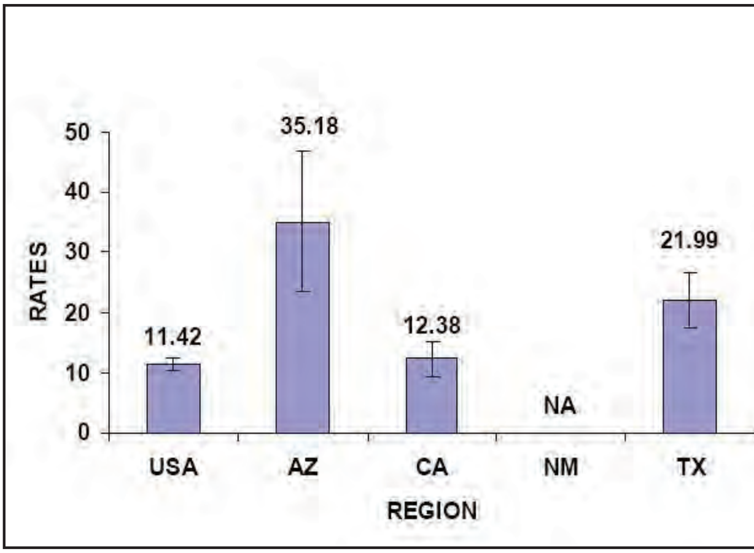

Figure 32: **Crude rates of Congenital Syphilis (per 100,000) by region, 2003**

HIV/AIDS

HIV is the acronym for human immunodeficiency virus, which causes acquired immunodeficiency syndrome (AIDS). HIV attacks the immune system by finding and destroying a type of white blood cell (i.e., T cells or CD4 cells) needed to fight diseases and infections. AIDS is the final stage of HIV infection and may develop after many years of infection with HIV. The immune system of persons diagnosed with AIDS is extremely fragile and they have difficulty fighting infections.

Because HIV cannot survive long outside the body, the virus is not transmitted through day-to-day activities (e.g., shaking hands, touching a doorknob, hugging, sitting on a toilet seat, drinking from a drinking fountain, etc). However, HIV is transmitted via the blood, semen, or vaginal fluids of an infected person. A person's risk of becoming infected with HIV increases dramatically when they have sex (anal, vaginal, or oral) with someone infected with HIV or share needles and syringes with someone infected with HIV. Offspring of HIV-positive women may become infected before or during birth or through breast feeding.

HIV-positive persons may not realize they are infected until months or even years after exposure. The only way to confirm an HIV-positive diagnosis is to be tested for the virus. Thus, any exposure to blood, semen, or vaginal fluids of another person is considered risky. Factors that may increase the risk for infection include sharing injection drug equipment (e.g., needles, syringes, cotton, water); having unprotected (i.e. without a condom) vaginal, anal, or oral sex with men who have sex with men, multiple partners, or anonymous partners; exchanging sex for drugs or money; having been diagnosed or treated for hepatitis, tuberculosis, or other sexually transmitted infections; or having unprotected sex with a person with any of these risk factors.

Treatment for HIV is available and may reduce the virus to undetectable levels, but current treatment regimens do not eliminate the virus from the body. Infected patients still need to take antiretroviral drugs and may pass the infection on to others even if treatment is effective.

The Healthy Border 2010 objective for the United States for HIV/AIDS is to reduce HIV-positive incidence rate by 50 percent (BHC, 2003a). Because California only began reporting HIV cases in mid-2002, it is not possible to calculate HIV incidence trends since 2000 for the entire border area. Based on HIV reporting for the border areas of Arizona, New Mexico, and Texas, the HIV incidence rate has fallen by 48 percent, from 7.9 in 2000 to 4.1 in 2004. Future reviews of HIV incidence in the border region will include data from California.

The data presented in this section refer to new HIV and AIDS cases reported by each border state for 2004. The accompanying graphics provide the number and percentage of cases for each mode of exposure. The text further contextualizes the data by characterizing each source of exposure as a percent of total cases for the regions under consideration.

Definitions

In men, HIV has four major sources of transmission: men having sex with men (MSM), injection drug use (IDU), men having sex with men who also use injection drugs (MSM/IDU), and heterosexual contact. There is also an "other" category that includes transmission modes such as hemophiliacs, those who received transfusion of blood or blood components/transplant, adults with confirmed other risks, adults who cannot be classified, and all pediatrics modes.

In women, transmission of HIV is limited to two major sources: IDU and heterosexual contact. A residual "other" category encompasses hemophiliacs, those who received transfusion of blood or blood components/transplant, adults with confirmed other risk, adults who cannot be classified, and all pediatrics modes.

Males and HIV

Figure 33 shows the percent and number of new male HIV cases reported in 2004 by border state and mode of transmission. These numbers varied considerably. California reported the greatest number of new HIV cases (7,398), and Texas reported the second most (2,975). Arizona reported 390 cases and New Mexico reported 92. Across border states, at least one-half of new cases in 2004 were contracted through an MSM transmission. Nearly three-fourths (74 percent) of cases in California and more than half (61 percent) of cases in Texas were among MSM. Injection drug users accounted for about one in every nine cases in Arizona, New Mexico, and Texas. Other modes of transmission account for a lower proportion of cases, though in New Mexico about one-fifth of cases were MSM/IDU.

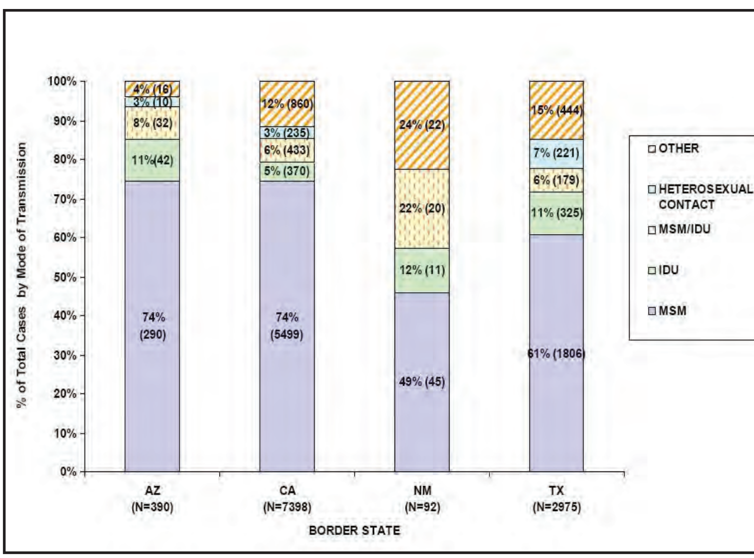

Figure 33: **Percent and number of new male HIV cases by border state and mode of transmission, 2004**

Table 1 shows male HIV rates by border state and mode of transmission. Rates of HIV among males varied by mode of transmission throughout the border states. For example, the rate of infection among MSM for California was 30.70 per 100,000; the next highest rate was observed in Texas (16.12 per 100,000). The rate of infection among IDU was highest in Texas (2.90 per 100,000).

	MSM	IDU	MSM/IDU	HETEROSEXUAL CONTACT	OTHER
Arizona (N=390)	10.09 (8.93, 11.25)	1.46 (1.05, 1.92)	1.11 (0.76, 1.57)	NA	NA
California (N=7398)	30.70 (29.89, 31.51)	2.07 (1.86, 2.28)	2.42 (2.19, 2.65)	1.31 (1.14, 1.48)	4.80 (4.48, 5.12)
New Mexico (N=92)	4.81 (3.51, 6.44)	NA	2.14 (1.31, 3.31)	NA	2.35 (1.47, 3.56)
Texas (N=2975)	16.12 (15.38, 16.86)	2.9 (2.58, 3.22)	1.60 (1.71, 2.23)	1.97 (1.71, 2.23)	3.96 (3.59, 4.33)

Table 1: **Male HIV rates by border state and mode of transportation, 2004**

Females and HIV

Figure 34 shows the incidence of HIV infection in women in the border states. California reported the greatest number of new cases of HIV in women in 2004 (1176), followed by Texas (930), Arizona (77) and New Mexico (22). The data for 2004 indicate that heterosexual contact was the primary source of exposure for women in Arizona (73 percent of all state cases), California (38 percent of all state cases) and Texas (50 percent of all state cases). Women in New Mexico were equally affected by heterosexual contact and other sources (45 percent for each). Injection drug use accounted for 21 percent of all women's HIV cases in 2004 in both Arizona and California and 16

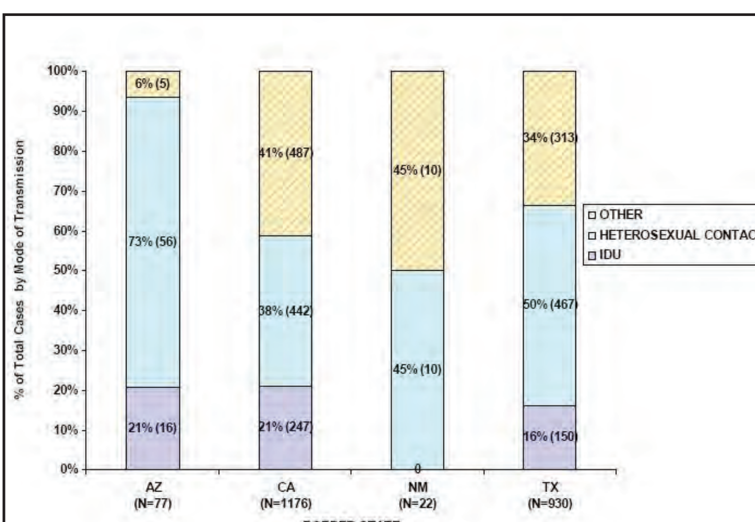

Figure 34: **Percent and number of new female HIV cases by border state and mode of transmission, 2004**

percent of all female HIV cases in Texas. Data were insufficient to assess injection drug use as an exposure source in New Mexico.

Rates of HIV among women varied by mode of transmission and state, as depicted in **Table 2**. Heterosexual contact accounted for the highest rates of transmission among women in Texas (4.14 per 100,000), while rates in California (2.46) and Arizona were similar (1.95).

	IDU	HETEROSEXUAL CONTACT	OTHER
Arizona (N=47)	NA	1.95 (1.47, 2.53)	NA
California (N=524)	1.37 (1.20, 1.54)	2.46 (2.23, 2.69)	2.71 (2.47, 2.95)
New Mexico (N=23)	NA	NA	NA
Texas (N=735)	1.33 (1.12, 1.54)	4.14 (3.76, 4.52)	2.77 (2.46, 3.08)

Table 2: **Women's HIV rates by border state and mode of transmission, 2004**

Males and AIDS

Figure 35 shows the total number of new AIDS cases in 2004 among males by border state and mode of transmission. Incidence of AIDS among males differed across border states. California had the greatest number of total cases (3941), followed by Texas (2386), Arizona (219), and New Mexico (131). For each state, MSM represented the group with the greatest number and proportion of cases. At least 50 percent of all cases in each state were among MSM. In addition, injection drug use represented another important mode of transmission for all states. The number of cases further increased when injection drug use was coupled with MSM. While heterosexual sex was also a notable mechanism of transmission, it accounted for no more than 11 percent of cases in any state.

Figure 36 shows the percent and number of new male AIDS cases in 2004 by border counties and mode of transmission. Of border counties, California (455) and Texas (144) reported the greatest number of new male AIDS cases in 2004, followed by Arizona (39) and New Mexico (12). The distribution of AIDS cases by transmission source in border counties was comparable to state-level patterns. For example, in Arizona and California border counties, about three-fourths of new AIDS cases were attributable to MSM. In Texas, 77 cases (53 percent of all new cases) were among MSM. Injection drug use contributed 6 new cases (15 percent) in Arizona border counties, 40 (9 percent) in California, and 16 (11 percent) in Texas. Heterosexual contact was another important source of exposure for men in California border counties (30 or 7 percent of all new cases) and Texas (20 or 14 percent of all new cases).

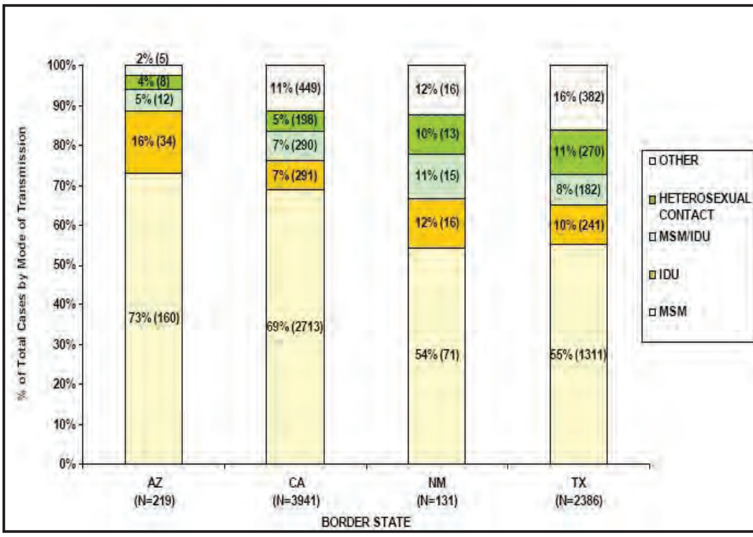

Figure 35: **Percent and number of new male AIDS cases by border state and mode of transmission, 2004**

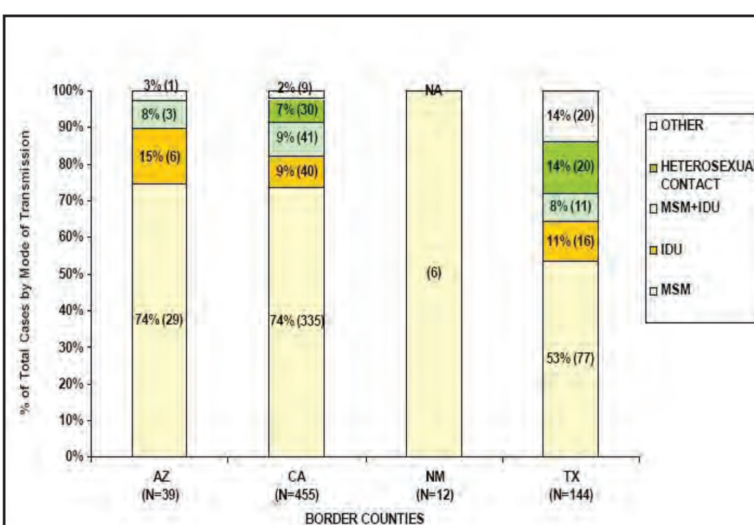

Figure 36: **Percent and number of new male AIDS cases by border counties and mode of transmission, 2004**

Table 3 summarizes male AIDS incidence rates by border state and mode of transmission. Of the border states, California exhibited the highest rate of MSM (15.14 per 100,000), followed by Texas (11.70). While lower than these, rates for New Mexico (7.58) and Arizona (5.57) were also elevated. Rates of IDU were substantially lower (below 2.50 per 100,000 for all states).

	MSM	IDU	MSM/IDU	HETEROSEXUAL CONTACT	OTHER
Arizona (N=219)	5.57 (4.71, 6.43)	1.18 (0.82, 1.65)	NA	NA	NA
California (N=3941)	15.14 (14.57, 15.71)	1.62 (1.43, 1.81)	1.62 (1.43, 1.81)	1.11 (0.96, 1.26)	2.51 (2.28, 2.74)
New Mexico (N=131)	7.58 (5.92, 9.56)	NA	NA	NA	NA
Texas (N=2386)	11.70 (11.07, 12.33)	2.15 (1.88, 2.42)	1.62 (1.38, 1.86)	2.41 (2.12, 2.70)	3.41 (3.07, 3.75)

Table 3: **Male AIDS rates by border state and mode of transmission, 2004**

Females and AIDS

Figure 37 provides information on new AIDS cases among women by their home state and mode of transmission. Of the four border states, Texas (735) and California (524) reported the greatest number of AIDS cases in women in 2004. In all states, heterosexual contact represented the most common mode of transmission, both numerically and proportionally, ranging from 49 percent of all new cases in Texas and California to 85 percent of all new cases in Arizona.

Table 4 summarizes data regarding female AIDS rates by border state and mode of transmission. Female AIDS rates associated with IDU were highest in Texas (1.45 per 100,000) and California (0.71). The rate of female AIDS cases associated with heterosexual contact was 3.16 in Texas, the highest rate among states reporting these data. Rates were lower in Arizona (1.39) and California (1.44).

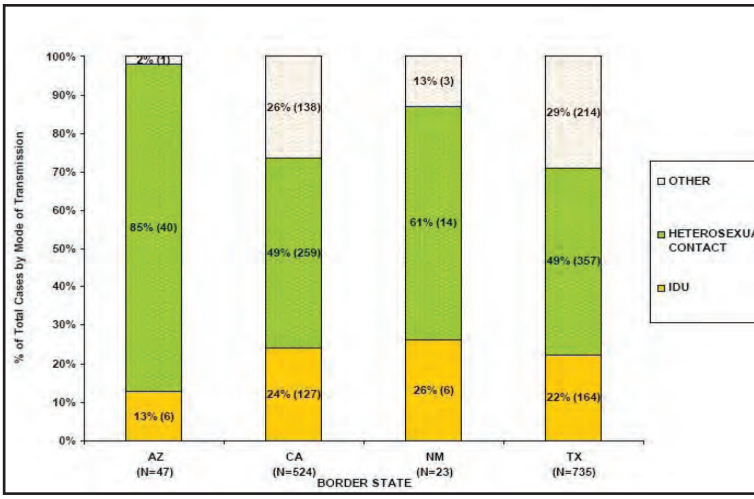

Figure 37: **Percent and number of newfemale AIDS cases by border state and mode of transmission, 2004**

	IDU	HETEROSEXUAL CONTACT	OTHER
Arizona (N=77)	NA	1.39 (0.99, 1.89)	NA
California (N=1176)	0.71 (0.59, 0.83)	1.44 (1.26, 1.62)	0.77 (0.64, 0.90)
New Mexico (N=22)	NA	NA	NA
Texas (N=930)	1.45 (1.23, 1.67)	3.16 (2.83, 3.49)	1.90 (1.65, 2.15)

Table 4: **Female AIDS rates by border state and mode of transmission, 2004**

Conclusion

The data presented in this chapter represent an initial attempt to document the incidence of infectious diseases in the four border states of Arizona, California, New Mexico, and Texas and the 44 border counties that lie north of the U.S.-Mexico border. The conditions reported upon here vary in their etiologies, symptoms, and modes of transmission, as well as severity and long-term consequences.

The data demonstrate much diversity among the border states and border counties with respect to the number and rates of new cases reported for each condition. Some diseases, such as TB and hepatitis A, disproportionately affect border states and counties compared to overall U.S. rates.

However, the picture was much more complex for many infectious diseases, including haemophilus influenza, hepatitis B acute, salmonellosis, shigellosis, streptococcal disease and typhoid. Rates of disease for some of these conditions were higher in border states than across the United States; for other conditions, border state rates were lower than national rates. Discrepancies were also found when border counties' rates were compared to disease rates in their corresponding border states. For example, data on salmonellosis showed that California and Arizona fared better than the nation as a whole and had lower crude rates of cases compared to the national rate. While New Mexico and Texas had higher rates than the nation, New Mexico and Texas border counties reported lower crude rates of salmonellosis than their states, while Arizona and California border counties had higher rates.

This analysis also identified several infectious diseases for which rates in border states were lower than the national rate, including E. coli, giardiasis, hepatitis C. acute, listeriosis and pertussis. Diseases were also identified that had lower rates in border counties than in those counties' respective states (e.g., giardiasis).

Rates were suppressed for many conditions because there were insufficient cases to meet criteria for reportability. In addition, the low number of cases often did not permit identification of geographic variation in disease rates. Nevertheless, findings revealed variations in disease incidence across geographic regions for many diseases.

These findings have various implications. Significantly, the data indicate that assumptions regarding the incidence and prevalence of infectious diseases in border states and counties must be examined systematically, using the best available data. By adopting this approach, public health and policy interventions will be well-guided and will match the needs of the population. Additionally, federal health agencies and state health departments must consider the special needs of their border counties. The unique sociodemographic and geographic characteristics of the region, especially the pervasiveness of cross-border traffic, may facilitate the transmission of infectious diseases. More in-depth research studies are needed to understand the many factors affecting disease rates in the border region. Finally, the presence of a large and diverse Hispanic population in all border states and counties calls for public health interventions that can reduce the burden of infectious diseases and that are culturally and linguistically sensitive. Such interventions must take into account important differences in generational status, language, and ethnic subgroup compositions. Efficient prevention and control of infectious diseases in the border region frequently requires close collaboration between health agencies from the United States and Mexico.

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CHAPTER 6

BREAST AND CERVICAL CANCER

Introduction

Cancer is a major public health problem, the second most common cause of death and an important cause of morbidity in both the United States and the U.S.-Mexico border region. Cancer is expected to become the leading cause of death in the United States in the next decade (Stewart, 2004), and it is likely that cancer deaths among residents of the U.S.-Mexico border region will follow a similar trend. It is estimated that more than 1.4 million new cancer cases will be diagnosed in the United States in 2008, with about 286,000 occurring in the border states of Arizona, California, New Mexico and Texas (Jemal, 2008).

Cancer contributes significantly to the cost of health care in the United States. The National Institutes of Health (NIH) estimated the overall costs for cancer to be $206.3 billion in 2006. This figure includes $78.2 billion for direct costs, $17.9 billion for indirect costs, and $110.2 billion in loss of productivity due to premature death (American Cancer Society [ACS], 2008).

Breast cancer is of significant concern, both nationwide and on the border. Among women in the United States, breast cancer is the most frequently diagnosed cancer and causes more deaths than any other cancer except lung cancer. In the border region, breast cancer is the leading cause of female cancer deaths. Nationwide, approximately 180,000 new cases of invasive breast cancer will be diagnosed in 2008, and about 40,000 women will die of this disease (Jemal, 2008). Almost 37,000 new cases of breast cancer will be diagnosed in 2008 in the four border states.

Cervical cancer is ranked thirteenth nationally in terms of incidence rates for women in 2003 but is the sixth leading cancer site for Hispanic women (Howe, 2006). In addition, death rates for cervical cancer in the United States and in the border region are higher among Hispanics than non-Hispanic whites (Giuliano, 2001). Screening is especially important for early detection and treatment for both cervical and breast cancer (Frisell, 1991; Chan, 2003). Low rates of screening and treatment often lead to cancer being diagnosed at later stages, when it is more aggressive. Limited access to health-care services and prior screening history are the primary reasons for ethnic disparities in cancer screening (Zembrana, 1999; Gorin, 2005; Ramirez, 2005).

Cancer is a major focus area of the Healthy Border 2010 program. Two Healthy Border 2010 objectives directly focus on cancer: reducing the female breast cancer death rate by 20 percent, from 27.2 to 21.8 per 100,000 women; and reducing the cervical cancer death rate by 30 percent, from 3.7 to 2.6 per 100,000 women. Other Healthy Border 2010 objectives also include several of the most important risk factors for cancer of all types. These include increasing access to primary care or basic health services, and reducing the number of hospital admissions for acute pesticide poisoning. Improvements in these areas also will reduce cancer incidence and mortality.

The aim of this chapter is to provide an overview of cancer morbidity and mortality for residents of the U.S.-Mexico border region. Special emphasis is placed on two cancer types, female breast and cervical cancers.

Understanding Cancer

Cancer is a group of diseases characterized by uncontrolled growth and spread of abnormal cells. Cancer cells develop when the genetic material that directs cells' activities, called deoxyribonucleic acid (DNA), is damaged. Normally, the body is able to repair damaged DNA. In cancer cells, however, damaged DNA is not repaired. Unlike normal cells, which divide only to replace worn-out or dying cells and to repair injuries, cancer cells continue to grow and divide, forming more abnormal cells. In most types of cancer, the cells form tumors. Cancer cells can also travel to other parts of the body in a process called metastasis. The type of cancer is based on the place it began. For instance, breast cancer that spreads to the brain is still called breast cancer (ACS, 2008).

Cancer risk factors include environmental (radiation, second-hand smoke, some viral agents, others), behavioral (diet, alcohol abuse, tobacco use), and hereditary factors among others. They may act singly or synergistically. Behavioral risk factors can be modified to significantly reduce the occurrence of cancer. It is estimated that cancers related to smoking and alcohol consumption can be completely prevented by eliminating these risk factors, and that those related to overweight, physical activity, nutrition, and sun exposure can be significantly reduced or prevented by reducing weight, eating healthier diets, increasing exercise, and using sun blockers (ACS, 2008).

Methods

This summary of cancer incidence and mortality for the U.S.-Mexico border region draws on a variety of data sources. Incidence data in this chapter are from state and regional cancer registries, including those participating in the National Cancer Institute's (NCI) Surveillance, Epidemiology and End Results (SEER) Program, and the Center for Disease Control and Prevention's (CDC) National Program of Cancer Registries (NPCR). Combined, the SEER and NPCR registries cover 98 percent of the U.S. population (U.S. Cancer Statistics Working Group [USCSWG], 2007). Incidence estimates for 2008 were produced by the American Cancer Society (ACS) (Jemal, 2008). Data are presented for cancers of all sites combined, by sex and ethnicity, as well as for selected cancer sites.

Hispanic ethnicity is not always reported on cancer registries. To improve the identification of Hispanics, the North American Association of Central Cancer Registries (NAACCR) has developed an algorithm based on a number of items including surname and maiden name (Howe, 2006). This algorithm is used by the SEER and NPCR registries and is the basis for the Hispanic cancer incidence data that appear in this chapter.

Mortality data used in this chapter are from the national vital statistics data system of the National Center for Health Statistics (NCHS). Death rates due to malignant neoplasms are presented for the border region, with state and national comparisons where appropriate. Within the border region, comparisons are made across the combined border counties of each border state. In many cases data are presented separately for the two major population groups on the border, Hispanics and non-Hispanic whites. Hispanic ethnicity also is thought to be underreported on death certificates; this is attributed in part to the fact that funeral directors are responsible for completing this item (Rosenberg, 1999). The most recent mortality information available when this chapter was written was from 2004. Every attempt was made to use the most recent data, but in some cases it was necessary to combine multiple years of mortality data to present statistically reliable measures.

Information on risk factors and cancer screening are from the Behavioral Risk Factor Surveillance System (BRFSS) for the United States and the four border states. BRFSS data also are available for the 32 counties that form the border region in Texas.

Rates and all other results are age-adjusted to the U.S. 2000 standard population and are per 100,000 population. Cancer incidence rates are age-adjusted to the U.S. 2000 standard population using 19 age intervals, while death rates are age-adjusted using 11 age intervals. Ninety-five percent confidence intervals are provided for most estimates. Differences between two rates are considered statistically significant only if their confidence intervals do not overlap.

Longer-term trends in cancer incidence are measured by joinpoint analysis and are based on delay-adjusted data that have been modified to account for delayed submissions of cancer diagnoses (Kim, 2000). The data adjustment uses reporting-delay models developed with 1981-2004 SEER registry data (Howe, 2006). Because these models are not appropriate for more recent fixed time intervals, incidence trends for fixed-time intervals are based on unadjusted data.

Levels and Trends in Cancer Incidence and Mortality

Cancer incidence

In 2004, an estimated 1.37 million cancer cases of all sites were diagnosed in the United States (Jemal, 2008). In the same year, more than 250,000 cancer cases of all sites were diagnosed in the four border states (USCSWG, 2007). Within the next 50 years, it is estimated that the combined effects of population growth and aging will double the annual number of Americans diagnosed with cancer (Espy, 2007).

Table 1 provides 2004 incidence rates for cancers of all sites in the United States and border states, by sex and ethnicity. The national incidence rate for all sites (458.2 per 100,000) was significantly higher than the rates in all four of the border states. For all ethnicities combined, male incidence rates were 25 percent or more above female rates at the national and border state levels; the same sex disparity existed for Hispanics. Incidence rates for Hispanics (both sexes combined) were also 25 percent or more below the all ethnicities rate for the U.S. and for all border states except New Mexico, where the differential was 15 percent.

Figures 1a and 1b provide 2004 national cancer incidence rates for the five leading sites by ethnicity and sex. Cancer of the prostate was the leading incident cancer among men, for all ethnicities combined and for Hispanics; breast cancer was the leading cancer site for women in both groups. Incidence rates for every leading site were lower for Hispanics than for all ethnicities combined, among both men and women. Incidence rates for lung and bronchus cancer were much lower for Hispanics than for all ethnicities combined, 41 percent lower among men and 51 percent lower among women. The leading sites and their ranking were the same for males of all ethnicities and Hispanic males. Among women, the ranking of the leading sites differed slightly by ethnicity: Lung and bronchus were the second leading sites for all ethnicities, while colon and rectum were the second leading sites among Hispanic females.

	USA	Arizona	California	New Mexico	Texas
All ethnicities, both sexes					
Rate	458.2	383.3	435.0	409.0	442.2
C.I.*	457.4, 459.0	378.2, 388.4	432.7, 437.3	400.0, 418.2	439.2, 445.2
All ethnicities, males					
Rate	537.6	435.0	509.8	469.3	530.9
C.I.*	536.3, 538.8	427.0, 443.1	506.1, 513.6	454.9, 484.2	525.9, 535.9
All ethnicities, females					
Rate	403.1	345.3	382.7	363.9	380.4
C.I.*	402.1, 404.1	338.7, 352.0	379.8, 385.6	352.3, 375.8	376.7, 384.1
Hispanics, both sexes					
Rate	356.5	308.0	346.7	352.6	343.5
C.I.*	353.9, 359.1	294.6, 321.9	341.8, 351.7	337.9, 367.8	337.7, 349.4
Hispanics, males					
Rate	415.5	358.6	410.1	409.7	402.0
C.I.*	411.1, 420.0	335.5, 382.7	401.7, 418.6	385.7, 434.7	392.2, 412.0
Hispanics, females					
Rate	318.6	277.5	306.1	310.7	306.2
C.I.*	315.4, 321.8	260.9, 294.7	300.2, 312.2	292.2, 329.9	299.0, 313.5

***Table 1*: Invasive cancer incidence rates, all sites, USA and border states, 2004**

Source: U.S. Cancer Statistics Working Group. United States Cancer Statistics: 1999–2004 Incidence and Mortality Web-based Report. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; 2007.

* 95% confidence interval
Rates are per 100,000 population, age-adjusted to the US 2000 standard population.

In the border states, age-adjusted cancer incidence rates for the leading sites were generally the same or lower than the national rates by sex and ethnicity, although there were some differences. The Arizona rates for most of the leading cancer sites were significantly lower than the national rates. Hispanic males in Arizona had lower incidence rates for prostate cancer and Hispanic women had lower breast and colon cancer rates than the national Hispanic rates. Male cancer incidence in California was significantly above the national rate for prostate cancer, while the lung and colon rates were lower. Site-specific cancer rates for females in California were similar to national rates. Most incidence rates in New Mexico were not significantly different from national rates by sex or ethnicity. Incidence rates in Texas were significantly lower for prostate and breast cancers (all ethnicities and Hispanics) and similar to national rates for most of the other leading sites.

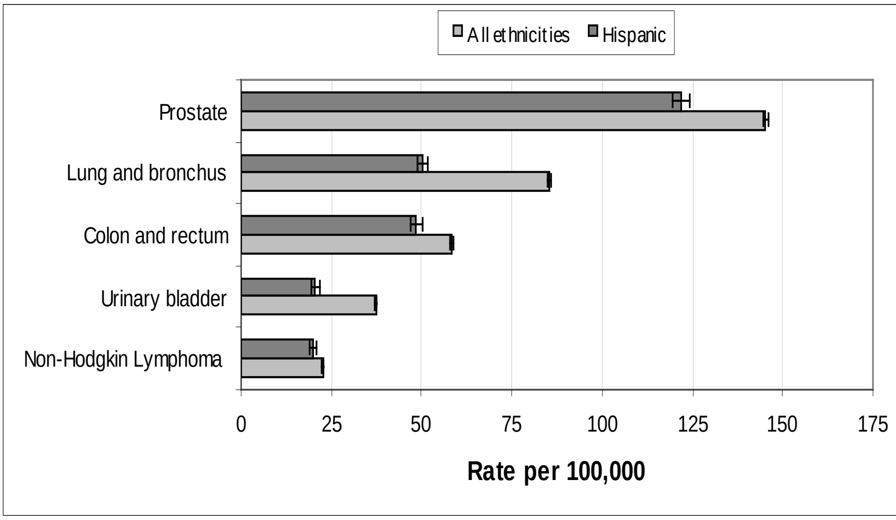

***Figure 1a*: Age-adjusted cancer incidence rates for 5 leading sites, USA males 2004**

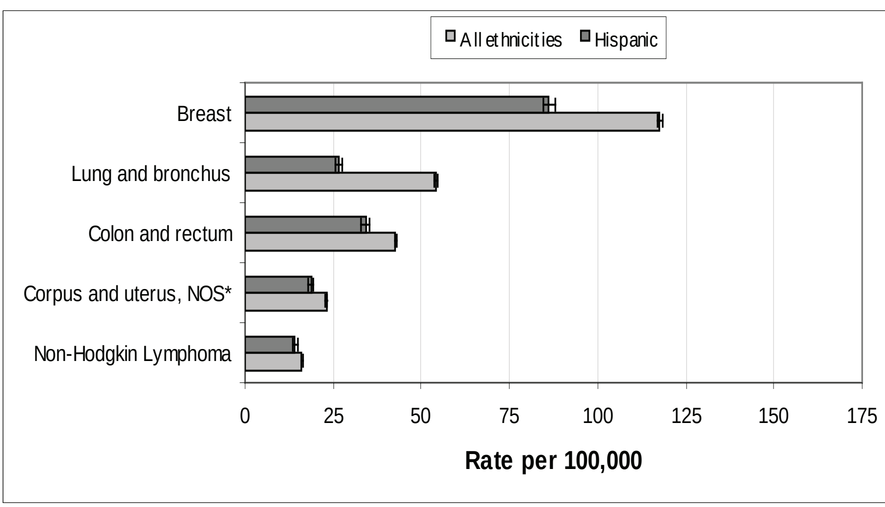

***Figure 1b*: Age-adjusted cancer incidence rates for 5 leading sites, USA females 2004**

Source: UCSWG, 2007
Rates are per 100,000 population, age-adjusted to US 2000 population.
*Not otherwise specified

Although Hispanics had lower incidence rates for all cancers combined and for the five leading sites, they had higher incidence rates for several cancers. At the national and border state levels, cancer incidence rates for Hispanics were 50 to 100 percent higher for liver, stomach, and cervical cancers (USCSWC, 2007). Infections are an important cause of all three of these cancers. Chronic bacterial infections with Helicobacter pylori (H pylori) can cause stomach ulcers, which are a significant source of stomach cancers (Peto, 2001). Infections with Human papillomavirus (HPV) are a major cause of cervical cancer (Walboomers, 1999), and infections with hepatitis-B and hepatitis-C viruses account for the large majority of liver cancer cases worldwide (Donato, 1998).

Helicobacter pylori infections are higher in lower socioeconomic groups, in particular in groups living in crowded conditions (Brown, 2000). Mexican-American women born in Mexico have a higher prevalence of HPV infection than other Hispanic groups (ACS, 2008). Age-adjusted seroprevalence rates for Mexican-Americans as compared to non-Hispanic whites were 2.2 times higher for H pylori (63.0 percent versus 28.4 percent), 1.8 times higher for hepatitis-B (5.3 versus 3.0), and 1.7 times higher for hepatitis-C (3.4 versus 2.0).

Trends

Trends in cancer incidence rates can be affected by a number of factors. First, changes in screening, including the introduction or discontinuation of a diagnostic test, can have a significant impact on the number of cancers diagnosed. For example, the rapid rise and then decline in the prostate cancer incidence rate is thought to be related to changes in the use of prostate-specific antigen testing (Jemal, 2004a). In addition, trends that use the most recent year of data may be misleading, because the most recent year submissions are approximately two percent below the total number of cancers that will eventually be submitted for that year (Ries, 2008). Trends described below are adjusted for delayed reporting, as described in the Methods section.

In the United States, the age-adjusted incidence rate for all cancer sites for males and females combined slowly decreased from 1992 through 2004, declining by 0.3 percent per year (Espy, 2007). This decline was only statistically significant when rates for both sexes were combined. The male incidence rate was stable from 1995 to 2004 while the female rate rose from 1987 through 1999 and remained stable thereafter. Incidence trends for specific sites, by sex, are provided in **Table 2**. Lung cancer incidence in men has declined by nearly 2 percent per year, beginning in 1991; colon and rectum cancer incidence has declined even faster (2.6 percent per year) beginning in 1998. Trends for other male cancer sites have been stable in recent years.

Since 2001, breast cancer incidence in women has fallen at an even faster pace, with a decrease of 3.5 percent per year, while colon and rectum cancer incidence in women has declined at an annual rate of 2.2 percent in recent years. However, the incidence of non-Hodgkin lymphoma among women has been rising at 1.4 percent per year since 1988.

The significant declines in incidence rates for several of the most important cancers are due to a number of factors. Reducing exposure to risk factors, such as tobacco use, has been a major contributor to the prevention of lung cancer. Improved screening and treatment of precancerous lesions has had a major impact on the incidence of colon and cervical cancers. Eradication of infections can play a major role in eliminating certain cancers, such as cervical, stomach, and liver cancer.

	Males			Females	
Site	Interval	Annual percent change	Site	Interval	Annual percent change
All sites	1995-2004	-0.2	All sites	1999-2004	-0.5
Prostate	1995-2004	0.4	Breast	2001-2004	-3.5**
Lung and bronchus	1991-2004	-1.8**	Lung and bronchus	1998-2004	-0.1
Colon and rectum	1998-2004	-2.6**	Colon and rectum	1998-2004	-2.2**
Urinary bladder	1999-2004	-0.9	Corpus and uterus	1998-2004	-0.8
NHL*	1991-2004	0.3	NHL*	1988-2004	1.4**

***Table 2*: Delay-adjusted trends in cancer incidence rates for the top 5 cancers, by sex, for all ethnicities**

Incidence of breast cancer

Breast cancer is the leading cancer site for women, both nationally and in each of the four border states. In 2004, an estimated 216,000 new cases of invasive breast cancer were diagnosed in the United States (Jemal, 2004b); in the four border states a combined total of 37,000 new cases of invasive breast cancer was reported (USCSWG, 2007). Breast cancer also was the leading cancer site for Hispanic women in the United States and the border states. A combined total of nearly 5,900 new cases of invasive breast cancer were diagnosed in Hispanic women in the border states in 2004.

Breast cancer incidence rates in **Table 3** are based on combined data for 2002-2004 to improve the precision of the rates. Nationally, the female breast cancer rate was more than 25 percent lower for Hispanic women than for all ethnicities combined (88.4 and 121.7 per 100,000, respectively). Similarly, Hispanic breast cancer rates were 25 percent or more below the all-ethnicity breast cancer rate in each of the border states. Female breast cancer rates for all ethnicities combined were significantly lower than the national rate for the states of Arizona, New Mexico, and Texas; California's rate was statistically similar to the national rate. Among Hispanic women, only Texas had a statistically lower incidence of breast cancer than the national Hispanic rate (82.8 versus 88.4).

Although county-level data on cancer incidence are available through the NPCR website, it is not possible to provide county-level incidence rates for several reasons. First, it was not possible to obtain rates for consistent years for all of

	Breast				Cervix			
	All Ethnicities		Hispanic		All Ethnicities		Hispanic	
	Rate	C.I.*	Rate	C.I.*	Rate	C.I.*	Rate	C.I.*
USA	121.7	121.4, 122.1	88.4	87.4, 89.4	8.3	8.2, 8.4	13.0	12.6, 13.3
Arizona	109.9	107.7, 112.1	82.1	76.9, 87.5	7.2	6.6, 7.8	10.2	8.6, 12.1
California	122.7	121.7, 123.6	87.0	85.2, 88.8	8.4	8.1, 8.6	13.4	12.7, 14.0
New Mexico	108.5	104.8, 112.3	85.2	79.6, 91.0	8.3	7.3, 9.4	9.8	8.0, 11.9
Texas	115.2	114.0, 116.4	82.8	80.6, 85.0	10.0	9.6, 10.3	14.9	14.0, 15.7

***Table 3*: Age-adjusted invasive incidence rates for breast and cervical cancer, USA and border states, 2002-2004**

Source: U.S. Cancer Statistics Working Group. United States Cancer Statistics: 1999–2004 Incidence and Mortality Web-based Report. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; 2007.
* 95% confidence interval
Rates are per 100,000 population, age-adjusted to the US 2000 population.

the border counties. In addition, not all of the border states provide county-level incidence information for Hispanics. Finally, only age-adjusted rates are provided for counties, so it was not possible to combine data across counties to measure incidence for the combined border counties of each state, or for all border counties combined.

Female breast cancer incidence rates have fallen rapidly in recent years, declining by 3.5 percent per year from 2001-2004 (Espy, 2007). A number of factors are known to influence incidence trends in age-adjusted breast cancer rates, including changes in obesity levels, the rate of mammography screening, hormone therapy, and other factors. The recent decline appears to be the result of declines in the use of hormone replacement therapy in postmenopausal women as well as a leveling-off in the rate of mammography screening (Ravdin, 2007; Jemal, 2007).

The lower breast cancer incidence rate for Hispanics also may be attributed to a number of factors. Hispanic ethnicity is underreported in cancer registries and likely remains underestimated even after the application of the adjustment algorithm described in the methods section above. Breast cancer screening rates for Hispanic women are lower than for non-Hispanic whites, although this difference is more influenced by factors associated with access to care than by language barriers or ethnicity (Selvin, 2003; Thompson, 2002). Risk factors for breast cancer include reproductive factors (higher age at first birth, low number of births, short length of breastfeeding, and other factors affecting hormone levels), overweight/obesity in postmenopausal women, diet, exercise, gene mutations, alcohol consumption, and others (Howe, 2006; Peto, 2001). Hispanic women differ from non-Hispanic white women in terms of many of these risk factors. For example, Hispanic women have higher rates of teen pregnancy and higher number of births than non-Hispanic whites, as described in Chapter 4, “Maternal, Infant, and Child Health.” Despite a lower incidence rate for breast cancer, however, Hispanic women present with more advanced disease when diagnosed, even in settings with equal screening (Watlington, 2007).

Incidence of cervical cancer

Cervical cancer was the 13th leading cancer for U.S. women in 2004, with an estimated 10,500 cases diagnosed nationally (Jemal, 2004a) and 2,700 new cases diagnosed in the border states (USCSWC, 2007). Among Hispanic women, cervical cancer was the 7th leading cancer nationally, and the 6th or 7th leading cancer in the border states. A total of 1,023 new cases of cervical cancer were diagnosed in the four border states in 2004.

The national incidence rate for invasive cervical cancer in 2002-2004 was more than 50 percent higher in Hispanics than for all ethnicities combined (13 percent and 8.3 percent, respectively), as shown in Table 3. The all-ethnicities rate in Arizona was significantly lower than the national rate (7.2 as compared to 8.3), while the Texas rate was significantly higher (10.0 versus 8.3). The incidence of cervical cancer for Hispanic women in Arizona and New Mexico (10.2 and 9.8, respectively) was significantly lower than the national Hispanic rate (13.0). However the cervical cancer incidence rate was 14.9 in Texas, significantly higher than the national rate. Although the exact incidence of cervical cancer for the border region is not available, data suggest that the rate is higher than the national rate (Giuliano, 2001).

Research conducted in the 1980s and 1990s provided evidence for an etiological role of infection with sexually transmitted human papillomavirus (HPV) as the primary cause of cervical cancer (Schiffman, 1993). Other factors that may mediate the risk of cervical cancer are smoking, parity, use of oral contraceptives, other infections, and host susceptibility (Franco, 2003).

The decline in the national incidence of cervical cancer began earlier and the rate has fallen even more rapidly than breast cancer. The national incidence rate for cervical cancer began falling in 1975 and from 1996 to 2004 fell at an annual rate of 3.7 percent, using delay-adjusted incidence data. Among Hispanics, the age-adjusted incidence rate has declined at an annual rate of 3.6 percent from 1995 to 2003, based on unadjusted data (Howe, 2006). Screening and treatment of precancerous lesions has had a clear impact on cervical cancer incidence (Chan, 2003), although Papanicolaou (Pap) smear screening remains less common among Hispanics than in non-Hispanic whites, 74.7 percent versus

80.2 percent (Howe, 2006). The discovery of the role of human papillomaviruses (HPVs) in cervical cancer, followed by the development of HPV vaccines, may play a major role in further reduction of cervical cancer (Peto, 2001).

Cancer mortality

One in every four deaths in the United States is from cancer. Cancer is the second leading cause of death in both the United States as a whole, as well as in the 44 U.S. counties that lie north of the U.S.-Mexico border. In 2004, more than 553,000 deaths due to malignant neoplasms (cancer) took place in the United States (Miniño, 2007). In the same year there were slightly more than 100,000 cancer deaths in the border states and 10,260 deaths from cancer in the border region.

Figures 2a and 2b summarize 2004 age-adjusted cancer death rates by sex for the United States, border states, and the combined 44 border counties. For both men and women, U.S. cancer death rates per 100,000 were one-third lower for Hispanics than for non-Hispanic whites, 151 versus 229 for men and 101 compared to 161 for women. Hispanic cancer death rates also were significantly lower than the non-Hispanic white rate for men in the states of California and Texas, and for women in Arizona, California, and Texas. A comparison of cancer death rates across the four border states shows that Texas had the highest rates for men and women (all ethnicities combined), 231 and 152, and New Mexico had the lowest cancer death rates in the four states, 189 for men and 135 for women. Among Hispanics, however, New Mexico had the highest rates (187 for men, 123 for women) while California had the lowest death rates for men and women (146 and 102, respectively).

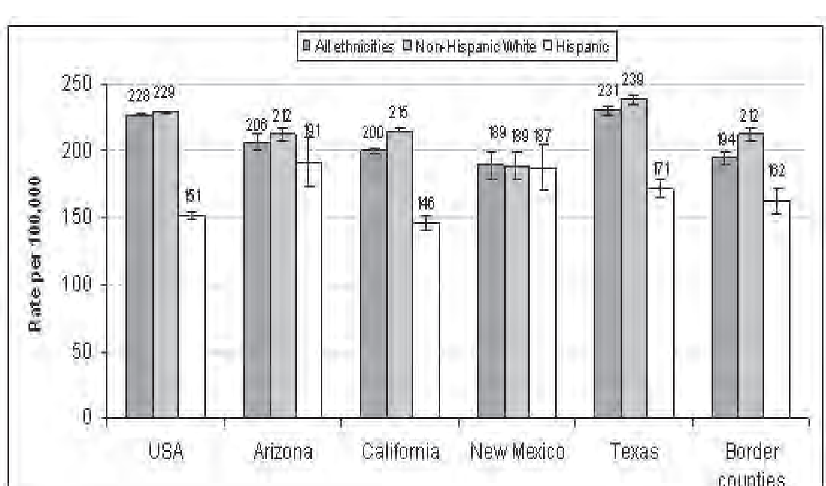

***Figure 2a*: Age-adjusted cancer death rates* by ethnicity, males; USA border states, and 44 border counties, 2004**

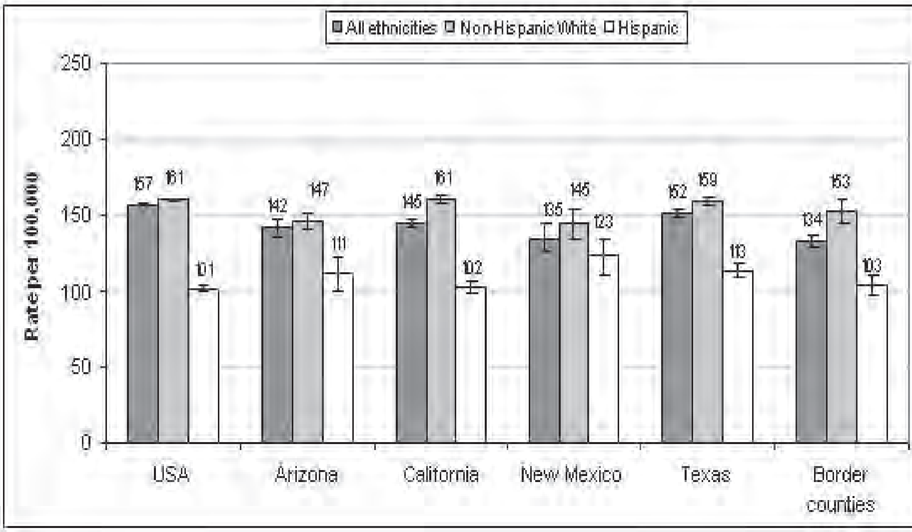

***Figure 2b*: Age-adjusted cancer death rates* by ethnicity, females, USA, border states, and 44 border counties, 2004**

Source: National mortality files, NCHS/CDC

* Age-adjusted to the U.S. 2000 standard population

For the border counties, cancer death rates for all ethnicities combined were one-third lower than the national death rate for men (194 versus 227) and 15 percent lower than the national rate for women (134 versus 157). The border county cancer death rates for Hispanics were statistically similar to the national Hispanic rates, for both men and women. Death rates for all ethnicities were similar to the rates for non-Hispanic whites, nationally and in the border states. In the border counties, the non-Hispanic white rate was lower than the national rate for men and statistically similar for women.

As with cancer incidence data, there is concern that cancer deaths among Hispanics are undercounted because of inaccurate reporting of Hispanic origin on the death certificate. The most recent review of this issue, using 1989-99 survey data matched to death certificates, found that 7 percent of deaths in Hispanics were erroneously identified as non-Hispanic (Rosenberg, 1999). The same report however indicated that the Hispanic death rate was underestimated by only 2 percent, because of undercoverage of Hispanics in the decennial census and population estimates.

Figure 3 presents 2002-2004 cancer death rates for the combined border counties of each state. Arizona and California had the highest cancer death rates for men (211 and 210, respectively), while New Mexico and Texas had significantly lower male death rates (191 and 171 respectively). The same pattern held for both sexes combined. For women, the Texas border counties had the lowest rate (116) while the border areas of the other three states had significantly higher female cancer death rates. The highest female death rate due to cancer was in the California border counties (152).

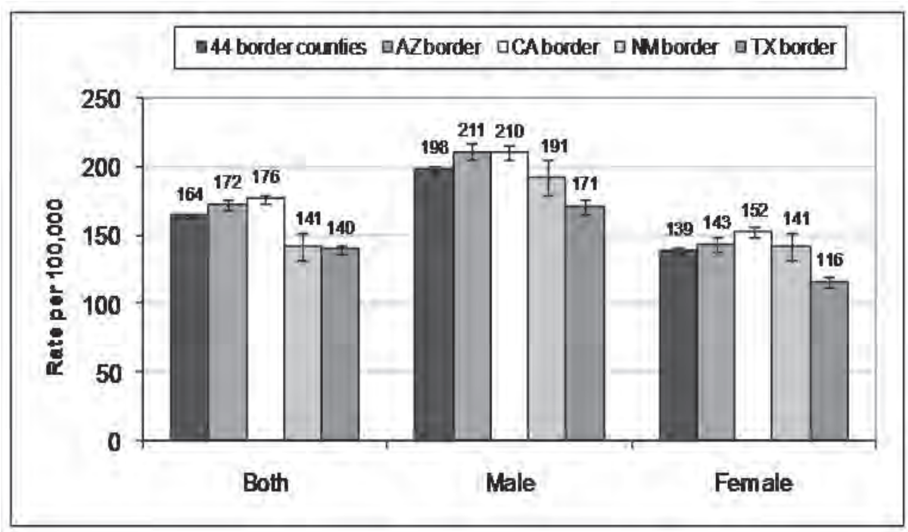

***Figure 3*: Age-adjusted cancer death rates*, all sites, border counties 2002-2004**

Source: National mortality files, NCHS/CDC

* Rates are per 100,000 population, age-adjusted to the U.S. 2000 standard population.

The three leading sites for cancer deaths are the same nationally as for the 44 border counties. For men, the three leading sites are lung and bronchus, prostate, and colon and rectum. For women, the most important sites are lung and bronchus, breast, and colon and rectum. For both the United States and the 44 border counties, death rates for all three sites were substantially higher for non-Hispanic whites than for Hispanics in 2002-04, as shown in **Table 4**. For lung and bronchus cancer, non-Hispanic white rates were two times higher for men and three times higher for women. In the border counties, the non-Hispanic white rates for lung and bronchus cancer were 1.7 times higher for men and 3.1 times higher for women. Death rates for the other cancer sites were also higher for non-Hispanic whites, although the differentials were smaller: The rate ratio for prostate cancer was 1.2 nationally and 1.1 for the border region (just shy of statistical significance). Rate ratios for breast cancer were similar: 1.6 nationally and 1.5 for the border counties. Colon and rectum rate ratios were in the 1.2 to 1.6 range. For all ethnicities, death rates for all three leading sites were higher for the United States than for the border, but this was primarily because of the higher proportion of Hispanics in the border counties. Border Hispanics did have higher death rates than non-Hispanic whites for uterine, cervical, liver and stomach cancer (data not shown).

	United States						
Male	All ethnicities		Hispanic		Non-Hispanic White		NHW/Hispanic
	Rate	CI	Rate	CI	Rate	CI	rate ratios
Lung and bronchus	71.6	71.4, 71.9	34.6	33.8, 35.4	73.5	73.2, 73.8	2.1*
Prostate	26.6	26.4, 26.8	20.2	19.5, 20.9	24.7	24.5, 24.9	1.2*
Colon and rectum	22.7	22.5, 22.9	16.4	15.8, 17.0	22.5	22.3, 22.7	1.4*
Female	All ethnicities		Hispanic		Non-Hispanic White		NHW/Hispanic
	Rate	CI	Rate	CI	Rate	CI	rate ratios
Lung and bronchus	41.2	41.0, 41.4	14.6	14.1, 15.0	44.4	44.2, 44.6	3.0*
Breast	25.1	25.0, 25.2	15.7	15.3, 16.2	25.1	24.9, 25.3	1.6*
Colon and rectum	16.1	16.0, 16.2	10.7	10.3, 11.1	15.9	15.7, 16.0	1.5*
	44 border counties						
Male	All ethnicities		Hispanic		Non-Hispanic White		NHW/Hispanic
	Rate	CI	Rate	CI	Rate	CI	rate ratios
Lung and bronchus	52.0	50.4, 53.6	36.3	33.9, 38.7	60.2	58.1, 62.3	1.7*
Prostate	24.6	23.5, 25.7	22.2	19.7, 24.8	25.5	24.1, 26.8	1.1
Colon and rectum	18.4	17.5, 19.3	16.0	14.4, 17.6	19.5	18.3, 20.7	1.2*
Female	All ethnicities		Hispanic		Non-Hispanic White		NHW/Hispanic
	Rate	CI	Rate	CI	Rate	CI	rate ratios
Lung and bronchus	30.3	29.3, 31.4	13.2	12.0, 14.4	41.0	39.4, 42.6	3.1*
Breast	23.0	22.1, 23.9	17.5	15.9, 19.0	26.4	25.1, 27.8	1.5*
Colon and rectum	13.1	12.4, 13.8	9.8	8.7, 10.8	14.6	13.6, 15.5	1.5*

***Table 4*: Age-adjusted cancer death rates, by site, sex and ethnicity, USA and 44 border counties, 2002-2004**

Source: National mortality files, NCHS/CDC.
* Rate ratio is statistically significant (p<.05).
Rates per 100,000 population, age-adjusted to the US-2000 standard population.

Trends in cancer death rates

Age-adjusted cancer death rates have been declining for all sites combined in recent years and rates also have declined for many individual sites (Espy, 2007). At the national level, death rates declined significantly between 1995 and 2004 for most of the ten leading sites, with the exception of liver (increasing), pancreatic (stable), and esophageal (increasing) cancer for men, and lung and bronchus (increasing), pancreatic (stable), ovarian (stable), and uterine (stable) cancer for women. For Hispanics, significant declines were recorded for most of the ten leading sites, except for liver (increasing), pancreas (stable), and kidney and renal pelvis (stable) for men. For Hispanic women, there were no significant increases in death rates for the top 10 cancer sites, although trends were stable for cancer of the colon and rectum, pancreas, ovary, and liver cancers.

These reductions are the result of changes in risk factor levels, improvements in early detection and treatment, and reductions in inequalities in cancer care, among others (Howe, 2006). At the national level, much of the decline in lung cancer deaths results from the decline in tobacco use in recent decades. Timely detection and treatment largely account for the reductions in death rates due to colorectal, female breast, and prostate cancer.

Table 5 presents the annual percent change in cancer death rates for all sites, for the United States and the 44 border counties between 1999 and 2004. For the United States, significant downward trends in cancer death rates were reported for both sexes and all ethnicities combined. In the border counties, declines were reported for all groups. However some of the downward trends were not statistically significant because of small numbers.

	USA				44 border counties		
	All ethnicities				All ethnicities		
	1999	2004	APC		1999	2004	APC
Both sexes	200.8	185.8	-1.5*	Both sexes	173.7	159.2	-1.7*
Male	251.9	227.7	-2.0*	Male	213.1	194.1	-1.9*
Female	167.6	157.4	-1.2*	Female	144.8	133.7	-1.6*
	Hispanic				Hispanic		
Both sexes	134.8	121.9	-2.0*	Both sexes	142.8	127.1	-2.3*
Male	170.7	151.2	-2.4*	Male	181.2	162.3	-2.2
Female	110.9	101.4	-1.8*	Female	115.8	102.9	-2.3*
	NHW				NHW		
Both sexes	201.3	188.6	-1.3*	Both sexes	188.4	178.4	-1.1*
Male	250.4	229.4	-1.7*	Male	227.1	212.2	-1.3
Female	169.4	160.9	-1.0*	Female	159.4	152.8	-0.8

***Table 5*: Annual percent change in age-adjusted cancer death rates, all sites, by sex and ethnicity, USA and 44 border counties, 1999 and 2004**

Source: National mortality files, NCHS/CDC
* Trend is statistically significant (p<.05)
Rates are per 100,000, age-adjusted to the U.S. 2000 standard population.

Breast cancer mortality

Breast cancer is second only to lung cancer as the leading cause of cancer-related deaths among women in the United States, while in the border region breast cancer is the leading cause of cancer deaths. Breast cancer death rates in the United States have fallen substantially in the past decade, declining at an annual rate of 2.3 percent from 1995 to 2004, despite a small increase in the incidence of breast cancer (Espy, 2007). In 2004, 41,000 U.S. women died from breast cancer nationally, while there were 7,600 female breast cancer deaths in the border states and nearly 800 in the combined border counties.

Table 6 shows female breast cancer death rates in 2002-2004 for the United States, the 44 border counties, and the combined border counties of each state. Both nationally and in the combined border counties of each state, breast cancer death rates were significantly lower for Hispanic women as compared to non-Hispanic white women. Nationally, the non-Hispanic white death rate was 50 percent higher than the Hispanic rate, while in the 44 border counties the non-Hispanic white death rate was 60 percent above the Hispanic rate. For all ethnicities combined, the border counties of Arizona and Texas had significantly lower death rates than the United States (21.8 and 19.3 versus 25.1). However, when compared separately the death rates for non-Hispanic white and Hispanic women in the border regions of all four states were higher than the U.S. rates (with the sole exception of Arizona non-Hispanic white women), although none of these differences reached statistical significance.

	All Ethnicities		Non-Hispanic White		Hispanic		NHW/Hispanic
	Rate	C.I.*	Rate	C.I.*	Rate	C.I.*	Rate ratios
USA	25.1	25.0, 25.2	25.1	24.9, 25.3	15.7	15.3, 16.2	1.6
Border counties	23.0	22.1, 23.9	26.4	24.2, 28.7	17.5	15.9, 19.0	1.5
Arizona border	21.8	19.8, 23.8	22.9	19.8, 26.0	17.1	12.8, 21.4	1.3
California border	25.7	24.2, 27.1	27.8	25.0, 30.6	18.2	14.9, 21.4	1.5
New Mexico border	25.8	21.4, 30.2	31.3	23.1, 39.5	16.5	10.3, 22.6	1.9
Texas border	19.3	17.8, 20.9	27.4	22.6, 32.2	17.2	15.2, 19.2	1.6

***Table 6*: Age-adjusted death rates for female breast cancer, USA and border counties, 2002-2004**

Source: National mortality files, NCHS/CDC.
* 95% confidence interval
Rates are per 100,000 population, age-adjusted to the U.S. 2000 standard population.

Cervical Cancer Mortality

Cervical cancer was the fourteenth leading cause of cancer-related deaths in the United States in 2004, but was the tenth leading cause among U.S. Hispanics. More than 3,800 women died of cervical cancer in 2004 in the United States. The U.S. cervical cancer death rate has declined substantially in recent years, falling at an annual rate of 3.5 percent between 1995 and 2004.

Table 7 provides cervical cancer death rates for the United States and the border region in 2002-2004. The cervical cancer death rate was significantly higher for Hispanic women than for non-Hispanic white women, at the national level and in the border region. The excess varied from 50 percent higher nationally to nearly three times as high in the Arizona border counties. For all ethnicities combined, the death rate in the 44 border counties was significantly higher than the national rate (2.9 and 2.5, respectively). Within the border region, the Texas border counties had the highest death rate (4.1) for all ethnicities combined.

Comparing rates separately for non-Hispanic white and Hispanic women shows that death rates in the Texas border counties were much higher than rates in the border areas of the other three states and significantly higher than national rates.

	All Ethnicities		Non-Hispanic White		Hispanic	
	Rate	C.I.*	Rate	C.I.*	Rate	C.I.*
USA	2.5	2.4, 2.5	2.1	2.1, 2.2	3.1	2.9, 3.3
Border counties	2.9	2.6, 3.3	1.5	1.1, 2.0	3.9	3.2, 4.5
Arizona border	1.7	1.1, 2.2	1.0	0.7, 1.2	2.8	2.1, 3.5
California border	1.9	1.5, 2.3	1.5	0.9, 2.1	2.4	1.3, 3.5
New Mexico border	3.4	2.3, 4.5	1.7	1.0, 2.4	4.6	1.9, 7.3
Texas border	4.1	3.4, 4.8	3.1	2.5, 3.7	4.5	3.6, 5.5

Table 7**: Age-adjusted death rates for cervical cancer, USA and border counties, 2002-2004**

Source: National mortality files, NCHS/CDC
* 95% confidence interval
Rates are per 100,000 population, age-adjusted to the U.S. 2000 standard population.

Risk Factor Prevalence and Screening

Advances in the biological sciences and epidemiology have led to the identification of many important causes of cancer. These findings have led to important gains in cancer prevention, achieved in part by reducing the prevalence of risk factors. Screening tests for cancer or precancerous lesions have also increased with the development of new and improved screening methodologies. The identification of cancers in their earliest stages, combined with more effective treatments, has reduced age-adjusted cancer death rates for many types of cancer.

One factor that is clear from data on cancer incidence and deaths is the increasing risk of cancer with age, particularly beyond age 35 years. **Figure 4** displays the rising level of male and female cancer death rates with age in the border counties in 2004. This age pattern has important implications given the rapid aging of the border population (see Chapter 1, "The U.S. Population at the Border"). Unless advances in cancer prevention and treatment continue to drive down incidence and death rates, the number of cancer cases and deaths will increase rapidly as the population ages. A growing number of cancer cases will further burden health care providers and health facilities in the border region.

Scientific research on the causes and risk factors for cancer has yielded increasing returns in recent years. Much of this information has been summarized on the website of the National Cancer Institute (2008). The carcinogenic effect of tobacco has been well established, particularly for lung, laryngeal, pancreatic,

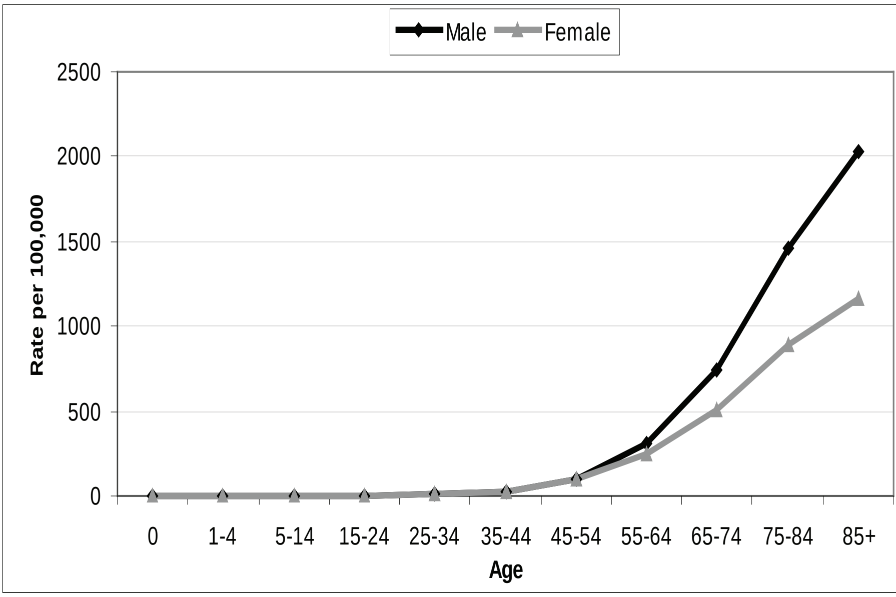

Figure 4: Age-specific death rates due to cancer, border counties, 2004

Source: National mortality files, NCHS/CDC

bladder, kidney, mouth, and esophageal cancers. Tobacco also has been identified as a cofactor in cervical, stomach and liver cancers. Dietary fats have been linked to colon cancer and possibly to breast cancer in postmenopausal women. Overweight contributes to cancer risk, including postmenopausal breast cancer, endometrial cancer, and others. Genetic factors play a role in many cancers, including BRCA1 and BRCA2 genes for hereditary breast cancer. Human papillomavirus (HPV) has been detected in virtually all cervical cancers worldwide, and along with various cofactors including smoking and others, leads to the development of cervical cancer. Reproductive factors that affect female hormone levels, along with hormone therapies, have been linked to a number of cancers including breast, uterine, and ovarian cancer. Viruses and retroviruses play an important role in the development of several cancers. As noted earlier, H pylori is a major factor in the development of stomach cancer, along with a diet that is high in preserved foods that are pickled, smoked or heavily salted. Hepatitis B and C viruses have been linked to the development of liver cancers. Heavy alcohol use is a factor in the development of liver, breast and laryngeal cancers.

Table 8 provides data on risk factor prevalence and screening rates for the United States, the four border states, and the border counties. Data are presented by ethnicity where available. Information for the border counties is only available for the 32 Texas counties on or near the Texas-Mexico border. For most risk factors, state prevalence rates were similar to U.S. rates, although Hispanic rates were generally higher than the all-ethnicity rates. Risk factor

	Ethnicity	USA	Arizona	California	New Mexico	Texas	TX border
Risk factors							
Percent current smokers, age 18+	All	20.4	20.4	15.2	21.6	20.1	18.1
	Hispanic	17.5	21.2	15.0	23.6	16.2	18.6
Percent obese, age 18+	All	27.9	21.4	22.6	21.8	27.1	30.9
	Hispanic	26.7	23.0	27.1	26.5	31.9	34.9
Percent with no leisure-time physical activity, age 18+	All	25.5	22.6	26.0	22.9	27.4	29.1
	Hispanic	na[a]	na	26.7	na	35.6	31.5
Percent binge drinking (5+ drinks), age 18+	All	14.3	14.5	14.0	10.6	14.3	15.9
	Hispanic	16.9	16.9	16.7	13.9	17.4	16.6
Percent heavy drinking (2+/ day men, 1+/day women)	All	5.2	6.3	6.2	4.1	5.3	5.5
	Hispanic	5.2	5.0	6.4	4.0	6.0	6.3
Percent with less than 5 fruits and vegetables per day	All	77.4	77.1	73.1	77.6	78.6	78.7
	Hispanic	77.9	79.3	73.5	82.5	79.5	80.0
Access to health care							
Percent with no health insurance coverage, age 18+	All	14.5	20.9	17.2	21.9	28.5	47.5
	Hispanic	36.1	48.5	31.9	32.8	55.8	61.3
Cancer screening							
Percent with mammography in past 2 years, age 40+[b]	All	74.9	75.5	76.5	69.1	67.8	62.2
	Hispanic	na	na	na	na	60.4	58.4
Percent with colorectal cancer screening, age 50+[b]	All	53.5	52.1	53.9	50.7	48.4	40.7
	Hispanic	na	na	na	na	40.6	30.1
Percent with fecal occult blood test in past 2 years[b]	All	26.5	31.2	23.3	25.9	23.4	20.3
	Hispanic	na	na	na	na	14.9	10.3
Percent with pap smear in past 3 years, age 18+[b]	All	86.0	85.2	84.8	84.7	82.2	78.6
	Hispanic	na	na	na	na	79.2	76.8
Percent with PSA test in last year, age 50+[b]	All	51.8	54.3	51.6	49.1	49.4	40.3
	Hispanic	na	na	na	na	28.7	29.2

***Table 8*: Cancer risk factors, access to care, and use of cancer screening, USA, border states, and Texas border counties, 2005**

Source: BRFSS/CDC
[a] Not available
[b] 2004

prevalences in the Texas border region were even less favorable, with the exception of the smoking rate. California had the lowest percentage of current smokers (15.2), lower than the United States (20.4) and the other three border states. In all areas, smoking rates for both sexes combined were similar for Hispanics and non-Hispanic whites, but sex-specific rates differed substantially. Smoking rates for Hispanic men were similar to or higher than smoking levels for non-Hispanic white men, while smoking rates for Hispanic women were half or less the rate for non-Hispanic white women (data not shown). The high levels of obesity and physical inactivity were troubling for all areas and for Hispanics in particular. Health insurance coverage was significantly lower in all four border states than nationally, with the lowest rate in Texas (28.5 percent without coverage) almost twice the national rate of 14.5 percent. Among Hispanics, 48.5 percent lacked health insurance in Arizona, and 55.8

percent in Texas. The poorest level of health insurance coverage by far was for Hispanics in the border region of Texas (61.3 percent without health insurance). Cancer screening rates in the border states were similar to the national levels, although the rates for Hispanics in Texas and in the Texas border counties were lower. Separate data from the California Health Interview Survey also found significantly lower cancer screening rates for Hispanics than for non-Hispanic whites (data not shown) (California Department of Public Health, 2008).

Differences in screening rates between Hispanics and non-Hispanic whites may account for some of the differences in reported cancer incidence rates. As noted earlier, changes in screening rates can affect trends in cancer incidence. An increase in the use of cancer screening in a population can lead to a rise in cancer incidence because of earlier detection of tumors (White, 1990; Garfinkle, 1994). A large part of the increase in breast cancer incidence in the 1980s has been attributed to the increased use of mammography for breast cancer screening (Jemal, 2007). Lower cancer screening rates in Hispanics, as compared to other populations, may account for some of the lower cancer incidence rates reported for Hispanics.

Summary and Recommendations

In both the United States and the border region, progress has been made in the fight against cancer. Gains in cancer prevention and treatment have reduced cancer incidence and mortality. Yet the burden of cancer remains. Cancer is still the second leading cause of death in the nation and on the border.

For most of the leading cancers, incidence rates and mortality are substantially lower for Hispanics than for non-Hispanic whites. Some of this difference can be linked to lower levels of risk factors, such as lower smoking rates in Hispanics, while some of the difference may be due to underreporting of Hispanic cancers. However, much of this difference remains to be explained, particularly given the low socioeconomic status and poor access to health care of the nation's Hispanic population. This apparent contradiction has been termed the "Hispanic paradox" (Scribner, 1996)[1].

Cancer mortality in the border counties is lower than the national level, owing to low cancer death rates in border Hispanics and below-average cancer death rates for border non-Hispanic whites. Cancer mortality remains significantly higher for non-Hispanic whites than for Hispanics in the four border states and border counties. Overall, the highest cancer death rate was in the state of Texas and the lowest in New Mexico, but rankings differed for comparisons by

1 See also Chapter 4: "Maternal, Infant, and Child Health" and Chapter 8: "Heart Disease and Stroke" for further discussion of the Hispanic paradox.

ethnicity, gender and site. Within the 44-county border region, breast cancer mortality rates for the counties of Arizona (21.8) and Texas (19.3) were below the national average of 25.1 in 2002-04, with non-Hispanic whites having higher rates than Hispanics. Texas border counties (4.1) exceeded the national average death rate of 2.5) for cervical cancer, with rates above the national level for both Hispanic (4.5) and non-Hispanic white (3.1) women. The cervical cancer death rate for Hispanics was more than twice the non-Hispanic white rate (3.9 versus 1.5) in the combined border counties. The differential was nearly three to one in the Arizona border counties (1.0 versus 2.8).

Ethnic and socioeconomic disparities in access to care preclude many U.S. residents, especially those living in the border region, from obtaining preventive and adequate healthcare. In all four border states, health insurance coverage is significantly lower for the Hispanic population. Despite the availability of screening tests, screening rates are lower for Hispanics than for non-Hispanic whites in the two states with available data: Texas and California.

Progress toward the Healthy Border 2010 objectives of reducing breast and cervical cancer mortality in the border region should focus on improving early cancer detection through mammography, Pap, and colorectal cancer screening tests, creating public health education campaigns targeting the border population, and a research agenda that includes participation of ethnic minority groups. Given the higher levels of stomach, liver, and cervical cancer in Hispanics, more border resources should be devoted to immunization efforts against HPV and hepatitis-B, as well as treatment for H pylori infections. The following recommendations focus on areas of further research, public health interventions, and policy development.

- *Further research*. Further research is needed regarding incidence, causes, and treatment of cancers. Communication, collaboration, and training among cancer researchers need to be increased. An adequate infrastructure must be developed to increase funding for cancer research. Cancer researchers from under-represented racial and ethnic groups must be actively recruited, trained, and retained. Improvements are needed in the accessibility and analysis of cancer research data. Participation of minority and underserved populations in clinical trials must be included and encouraged.
- *Public health interventions*. Public health interventions should focus on building partnerships with public and private sectors at the state and community levels to develop prevention and early detection programs. State and community coalitions need to be built to deliver preventive health services to medically underserved women. Preventive programs should focus primarily on public health education and interventions to reduce risk factors like tobacco smoking, obesity, alcohol use, and to encourage increased physical activity and better nutrition.

- *Policy.* Policy makers, stakeholders, public health agencies, and healthcare providers should work to close the gap in health disparities, reduce illness, and improve early detection rates targeting the U.S.-Mexico border population — specifically minority and underinsured populations. Health-care coverage should be made universal and comprehensive, continuous, and affordable to individuals and their families. Access to high-quality care should be ensured. Moreover, policies, interventions, and health education initiatives should be considered and implemented in a transnational context given the proximity and the cross-border nature of the U.S.-Mexico population and region.

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CHAPTER 7

DIABETES

Diabetes is a major public health problem and an important cause of morbidity in both the United States and the U.S.-Mexico border region. In 2005, approximately 20.8 million persons were afflicted with diabetes, about 7.0 percent of the total U.S. population. In 2004, diabetes was the sixth leading cause of death in the United States (Heron, 2007, Miniño, Heron, Murphy, & Kochankek, 2007). For Hispanics, diabetes was the fifth, and for non-Hispanic whites the seventh, leading cause of death in the United States (Heron, 2007).

The prevalence of diabetes increases with age, and the disease disproportionately affects certain racial and ethnic minority populations. Diabetes affects Hispanics 1.5 times more than non-Hispanic whites. The growth of the U.S. population, which includes increases in elderly, racial, and ethnically diverse populations, predicts a substantial rise in the number of persons with diabetes.

Diabetes contributes significantly to the cost of health care in the United States. The direct and indirect costs associated with diabetes in 2002 reached $132 billion per year (Hogan, Dall, & Nikolov, 2003).

Diabetes is a major focus area of the Healthy Border 2010 program. Two Healthy Border objectives address diabetes: (a) reduce diabetes mortality by 10 percent and (b) maintain diabetes hospitalization rates at their 2000 level (U.S.-Mexico Border Health Commission, 2003). This chapter provides an overview of the current mortality and hospitalization rates along the U.S. side of the U.S.-Mexico border area[1]. Mortality and hospitalization discharge rates are presented by area, race, and age.

1 The United States-Mexico border region is defined as the area of land being 100 kilometers (62.5 miles) north and south of the international boundary (La Paz Agreement). It stretches approximately 2000 miles from the southern tip of Texas to California.

Understanding Diabetes

Diabetes mellitus results from a defect in insulin production, action — or both — associated with high levels of blood glucose. There are three major types of diabetes mellitus: type 1, type 2, and gestational diabetes. Type 1 diabetes develops when the body's immune system destroys the pancreatic beta cells that make insulin. Previously called insulin-dependent diabetes mellitus, or juvenile-onset diabetes, type 1 diabetes usually affects children and young adults and accounts for 5 to 10 percent of all diagnosed cases of diabetes in the United States. Type 2 diabetes, previously called non-insulin-dependent diabetes mellitus or adult-onset diabetes, usually begins as insulin resistance in which cells do not use insulin properly. The majority of all diagnosed diabetes cases (90 to 95 percent) are classified as type 2 diabetes. Gestational diabetes is a form of glucose intolerance diagnosed in some women during pregnancy. During pregnancy, gestational diabetes requires treatment to normalize maternal blood glucose levels to avoid complications in the infant. This phenomenon occurs in approximately four percent of pregnancies in women in the United States and usually disappears after the woman gives birth. However, 5 to 10 percent of women with gestational diabetes will subsequently develop type 2 diabetes (Report of the Expert Committee, 1997).

Diabetes Risk Factors: Age, Weight, and Genetics

Many of the risk factors for diabetes are the same as those for chronic conditions such as cardiovascular disease. In addition, diabetes has been found to be an independent risk factor for coronary heart disease because of its intricate relationship with lipoproteins and atherosclerosis. The vast majority of individuals with diabetes die from some type of cardiovascular disease, due to the fact that diabetes affects cholesterol levels (National Heart, Lung, and Blood Institute [NHLBI], 1996). One study found that diabetes doubled the risk of coronary heart disease and that this risk doubled when hypertension was present (NHLBI, 1994a). The following paragraphs briefly describe the effects of three main risk factors associated with diabetes: age, weight, and genetics.

Age

The likelihood of developing diabetes increases with age. In a study using data from the Behavioral Risk Factor Surveillance System (BRFSS), Mokdad et al. (2001) found that the national diabetes prevalence for subjects aged 18 to 29 years was 2.1 percent, whereas for those aged 70 years or older the prevalence was 15.5 percent. For all ages combined, women were reported to have higher diabetes prevalence than men, with 8.9 and 6.8 percent, respectively. Diagnoses of type 2 diabetes are increasing in children and adolescents, principally among high-risk ethnic minority groups, which include American Indians, blacks, Hispanics, and Pacific Islanders (American Diabetes Association [ADA], 2000; Hogan, et al, 2003; National Diabetes Information Clearinghouse [NDIC], 2005). In 2003, about 206,000 people under the age of 20 years had diabetes, representing 0.25 percent of all people in this age group (Centers for Disease Control [CDC], 2004a; HHS, 2000). The prevalence of diabetes in American Indian children was estimated to be 4.5 per 1000 (Fagot-Campagna, Burrows, & Williamson, 1999). To date, the cause of the increase in diabetes in children and adolescents has not been firmly elucidated. However, this increase follows closely the obesity epidemic currently present across the United States.

Weight

Overweight[2] and obesity[3] have been found to be independent risk factors for diabetes. A strong association has been found between obesity and risk for development of diabetes (Hu et al., 2001), especially for fat that is stored in the upper body (Hu et al., 2001; Wei et al., 1997).

The prevalence of both obesity and diabetes in the United States increased substantially from 1990 to 2000 (Mokdad et al., 2001). A study using BRFSS (Mokdad et al., 2001) found that the prevalence of obesity was 19.8 percent in 2000 and 20.9 percent in 2001. Furthermore, adults with a BMI ≥ 40 were at higher risk (odds ratio of 7.37, 95 percent confidence interval: 6.39 to 8.50) for developing diabetes than adults with normal weight. Men had a higher prevalence of obesity than women (21.0 and 20.8 percent respectively). Blacks had the highest obesity prevalence at 31.1 percent, compared with Hispanics (23.7 percent) and non-Hispanic whites (19.6 percent). Obesity increased with age, with the highest prevalence found in subjects in the 50 to 59 year age range. Obesity prevalence decreased with education: Those with less-than-high-school education had a prevalence of 27.4 percent and those with more-than-college education had a prevalence of 15.7 percent. Among the U.S. border states, Texas had the highest prevalence of obesity at 23.8 percent, and Arizona had the lowest at 17.9 percent. California had a prevalence of 20.9 percent and New Mexico 18.8 percent.

Research has shown that changes in lifestyle can prevent or delay excessive weight gain and consequently the onset of type 2 diabetes (Will, Williamson, Ford, Calle, & Thun, 2002). Therefore, physical exercise and weight loss are essential elements to the diabetes control regimen.

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2 Body mass index (BMI) 25-29.9.

3 Body mass index (BMI) > 30.

Genetics

Diabetes is influenced by heredity as well as by modifiable risk factors such as weight gain and dietary habits (NHLBI, 1996). Diabetes onset is caused by different factors, yet two factors are primarily important: a predisposition to the disease and an environmental trigger.

One such example of a genetic predisposition is found among the Pima Indians. The Pima Indians are a unique group of people that have been studied extensively in regards to their recent increase in diabetes morbidity. The Pima Indians in Arizona have one of the highest prevalence rates of type 2 diabetes in the world. In 2003 (CDC, 2004a, 2005b), about 27 percent of Pima Indians were reported to have diabetes. It is estimated that more than half of adults over the age of 35 years are afflicted with diabetes (Pratley, 1998). The increased prevalence of diabetes among this ethnic group is a recent phenomenon, which has been largely attributed to the "thrifty gene" theory. This theory suggests that a change from an agricultural to a modern American lifestyle, characterized by physical inactivity and western diet, has contributed to increased rates of obesity and diabetes (Pratley, 1998).

Type 2 diabetes, long considered a disease of older age, was first reported in adolescents among Pima Indians in 1979 (ADA, 2000). By 1996, the estimated diabetes prevalence in Pima Indians ages 15 to 19 years was 50.9 per 1000, and 22.3 per 1000 for those ages 10 to 14 years (Fagto-Campagna et al., 1999, Thackeray, Merrill, & Neiger, 2004).

Overall, diabetes prevalence rates are higher for American Indians compared to non-Hispanic whites. The prevalence of diagnosed diabetes is generally two to four times higher in American Indians compared to non-Hispanic whites (Thackeray, et al., 2004). It is worth noting that the Mexican-American population, the largest Hispanic group on the border, shares in the American Indian gene pool, along with a mixture of European and African roots, rendering this population susceptible to the effect of the "thrifty gene" as well (Idrogo & Mazze, 2004). It is possible that the relation to American Indians may in part explain our findings of higher prevalence of diabetes in the Hispanic population.

Studies comparing the prevalence of diabetes among individuals with similar genetic predisposition and different lifestyles indicate that modifications in behavioral risk factors such as diet and exercise may be capable of overriding a genetic predisposition to diabetes (U.S. Public Health Service, 1993). However, these results were not conclusive and further research is needed. Nonetheless, studies have found that individuals with diabetes who actively modify other health risks via weight control, physical activities, and by maintaining a consistent dietary intake low in sodium and sugar reduce their chances of diabetes complications (Zonseing, 1993).

Complications of Diabetes

Studies have shown that people with diabetes are at higher risk than are those without diabetes for complications due to heart disease, blindness, kidney failure, amputation of the extremities, stroke, dental disease, and other chronic conditions (Gu, Cowie, & Harris, 1999; Ingram, Gallegos, & Elenes, 2005; Kuulasmaa et al., 2000; Nathan, 1993; & Okoro et al., 2004). Mortality from heart disease among industrialized countries has been declining over the last decades (Kuulasmaa et al., 2000). However, this rate is still higher for people with diabetes than for those without diabetes (Gu et al., 1999), making heart disease the most frequent comorbidity cause of mortality among people with diabetes (Gu et al., 1999, Stamler, Vaccaro, Neaton, & Wentworth, 1993). Further risk factors contributing to this association include high total cholesterol, high blood pressure levels, smoking, and obesity. Although the prevalence of these conditions has been declining in the general population (Gu, et al., 1999) — with the exception of obesity (Burke, et al., 2003) — significant increases have been reported for diabetics in mean blood pressure and mean cholesterol levels (Okoro et al., 2004). One of two people with diabetes still has high cholesterol, one of three has high blood pressure, and one in six is a smoker (Imperatore et al., 2004). Yet these complications can be easily prevented or delayed with appropriate health-and preventive-care practices.

Methods

Analyses for this study used two main sources of information to delineate mortality and hospitalization discharge rates due to diabetes along the border. Rates were age adjusted[4] to provide a standardized comparison among the regions. The age-adjusted rates as well as their respective standard error (reported in parentheses) are provided in the text. Information on the applicability of the age-adjustment procedure utilized in this study is discussed in more detail elsewhere (Klein & Schoenborn, 2001). Z tests for two independent groups were used to compare statistical difference between the groups[5].

Mortality data from the NCHS for the years 1998 to 2004 by ethnicity (Hispanic and non-Hispanic white) for the border area were used to identify

4 Age adjustment to the 2000 U.S. standard population is the application of observed age-specific rates to a standard age distribution to eliminate differences in crude rates in population of interest that result from differences in the population's age distributions.

5 The z-test is a statistical test used in inference which determines if the difference between two means is large enough to be statistically significant, that is, if it is unlikely to have occurred by chance.

diabetes as the underlying cause of death. Comparisons of mortality rates were made between the four border states – Arizona, California, New Mexico, and Texas – and between border counties in these states. Hospitalization discharge data were obtained from the available public use hospital discharge data file system of each border state. Diabetes hospitalization discharge rates were presented for the total border population as well as by Hispanic and non-Hispanics.

Results

Prevalence of diabetes

Diabetes prevalence has increased in the United States in recent years. Data from the BRFSS[6] for 2000 show that the self-reported age-adjusted national diabetes prevalence was 4.5 percent. In a six-year period, the age-adjusted diabetes prevalence rose to 5.3 percent. Another more complete study shows that the standardized diabetes prevalence is even higher than the one reported by BRFSS. Results of the National Health & Nutrition Examination Survey (NHANES) show that the age-adjusted diabetes prevalence for 1999-2002 is 6.5 percent for the overall population. In addition, both non-Hispanic blacks (3.6 percent) and Mexican Americans (3.0 percent) report higher prevalence than non-Hispanic whites (2.7 percent). A clear trend in both studies shows that minority females have a greater proclivity to be identified as diabetic than males (Cowie et al., 2006).

This increase in diabetes also has taken place in the states that comprise the U.S.-Mexico border region. In 2000-2005, the age-adjusted prevalence for each border state was found to be higher than the national incidence for each respective year (**Figure 1**). In 2005, New Mexico and Arizona reported the lowest diabetes prevalence among the border states with 6.7 percent and 6.9 percent respectively. On the other hand, Texas and California reported higher prevalence rates than the national rate with 8.2 percent and 7.4 percent respectively. Texas reported higher diabetes prevalence among the border states from 2000 to 2005. In 2005, half of the 32 counties that comprise the Texas border region had estimated age-adjusted diabetes prevalence rates of 8.2 percent or higher. Among the Texas border counties, Kenedy and Kinney Counties reported the highest age-adjusted diabetes prevalence among all border counties[7] with 11.3 percent and 10.1 percent respectively. In 2005, a BRFSS survey done by the Texas Health department showed that for the cluster of Texas border counties, the unadjusted self-reported diabetes prevalence was 8.5 percent[8]. Although diabetes prevalence data for the counties along the U.S.-Mexico

6 http://apps.nccd.cdc.gov/BRFSS/
7 http://apps.nccd.cdc.gov/DDTSTRS/statePage.aspx?state=Texas
8 http://www.dshs.state.tx.us/chs/brfss/query/brfss_form.shtm

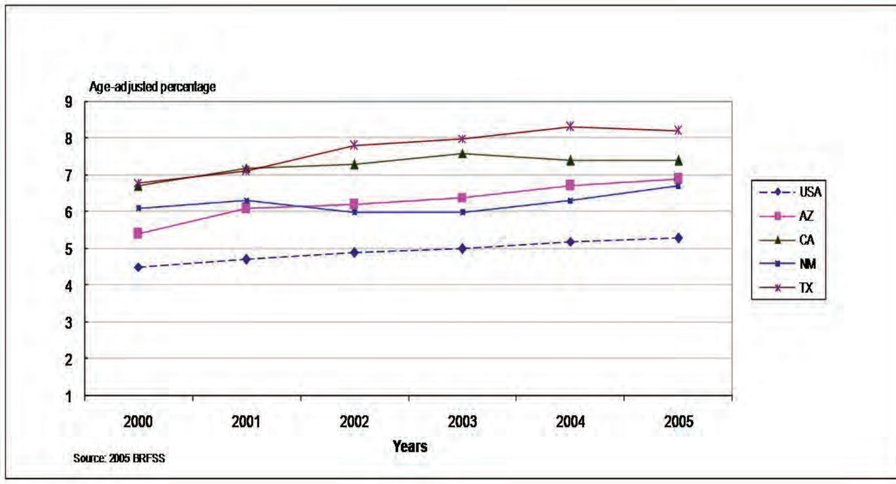


***Figure 1*: Adult population (18 years and older) self-reported diabetes prevalence, BRFSS 2000-2005**

border are limited, data from the Diabetes Prevention and Control Project, a study coordinated by the Pan American Health Organization (PAHO) along the U.S.-Mexico Border, and the state and local health departments of each border state, provides additional information. This survey was conducted from 2001 to 2002. Taking the border area as one epidemiological unit, it showed that the self-reported prevalence of diabetes in the U.S. portion of the border area was 16.1 percent and that 13.6 percent of the U.S. border population had been diagnosed with prediabetes[9]. An interesting finding from this study was that 2.6 percent of the border population was unaware of having diabetes at the time of the survey. This finding is comparable to that by NHANES, which showed that, from 1999 to 2002, approximately 2.8 percent of the United States population with diabetes was unaware that they suffered from this condition. Moreover, this trend was more pronounced among non-Hispanic blacks (3.6 percent) and Mexican Americans (3.0 percent) than non-Hispanic whites (2.7 percent).

Self-reported diabetes prevalence and self-glucose monitoring

Self-glucose monitoring rates among diabetics also have increased. In 2000, approximately 48.4 percent of the United States population with diagnosed diabetes reported daily self-monitoring blood glucose practices (BRFSS). In 2005, the prevalence of self-monitoring blood glucose increased to nearly two of every three or 61.0 percent of Americans with diabetes. BRFSS data from 2005 showed that the U.S.-Mexico border states had higher age-adjusted prevalence for self-monitoring of blood glucose than the national estimate. The percent of adults with diabetes who self-monitored their glucose levels on a daily basis was

9 Pre-diabetes is a condition that occurs when a person's blood glucose levels are higher than normal but not high enough for a diagnosis of type 2 diabetes (< 125 mg/dl > 100 mg/dl).

67 percent for the state of New Mexico and 65 percent for Arizona, both rates higher than the national percentage. However, only 52 percent of individuals with diabetes in California, a state with a high diabetes prevalence, reported that they self-monitored their blood glucose.

Healthcare visits for diabetes

Another outcome reported from BRFSS data was a modest increase in the percent of individuals who visited a doctor in the last year due to their diabetes. In 2000, approximately 86.0 percent of Americans with diabetes had seen a health-care professional due to their disease. In 2005, the national percentage increased to 87.7 percent. At the border, this trend was replicated for the states with high diabetes prevalence such as New Mexico, which reported the highest percentage of doctor visits for all border states at 91.0 percent. However, from 2000 to 2004, Texas and California reported lower percentages for visits to health-care providers for diabetes than the national average (**Figure 2**).

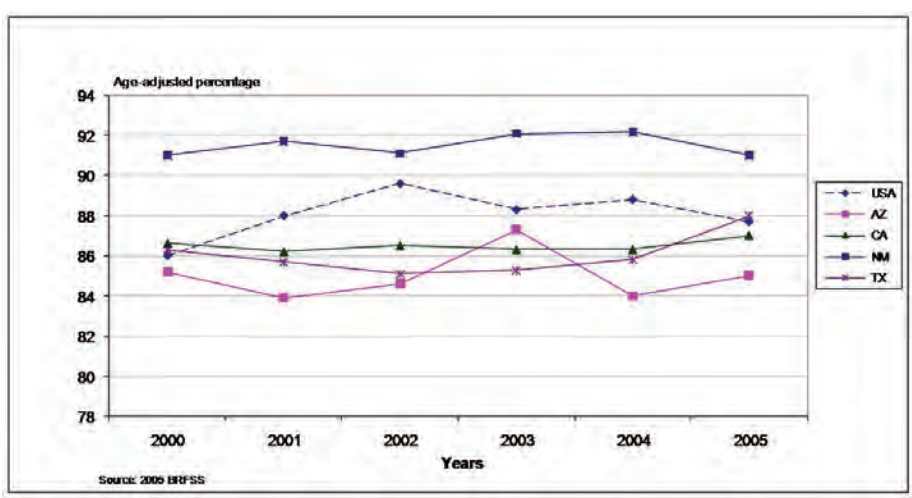


***Figure 2*: Adult diabetic population who have seen a health professional in the past year. BRFSS 2000-2005**

Hemoglobin A1c test

Hemoglobin A1c[10]testing is recommended to monitor blood sugar control and ultimately to judge whether a treatment plan provided by a health professional is adequately working (ADA, 2007)[11]. From 2000 to 2005, about two of

10 The hemoglobin A1c test (also known as glycosylated hemoglobin or HbA1c) provides information of the average blood glucose control for the past 2 to 3 months. The results allow for an evaluation of how well a particular diabetes treatment plan is working.

11 http://www.diabetes.org/type-1-diabetes/a1c-test.jsp

every three Americans with diabetes had at least two or more hemoglobin A1c tests performed in the previous year (**Figure 3**). In 2005 the prevalence of hemoglobin A1c testing along the border was higher for those states with higher diabetes prevalence such as Texas and New Mexico (67.0 percent and 69.0 percent, respectively). Since 2002, the prevalence of hemoglobin A1c testing for the state of California has been in decline. This finding creates some concern because of the high prevalence of diabetes in California.

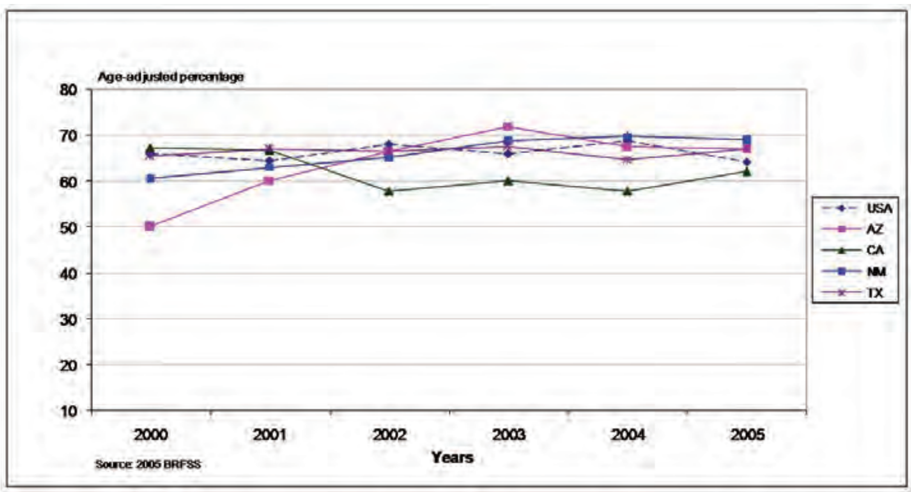


***Figure 3*: Adult diabetic population who had 2 or more hemoglobin A1c testing in the last year. BRFSS 2000-2005**

Foot examination

Foot examination has been a traditional and inexpensive method to physically examine the effects of diabetes. Comprehensive foot examination can help detect potential nerve damage in the feet or poor blood flow in the diabetic individual (ADA, 2008). Based on BRFSS data, in 2000, more than three of five (61.3 percent) Americans with diabetes had foot examinations in the last year. In 2005, the percentage increased to two of every three Americans (66.0 percent). Since this technique is inexpensive it has been used widely, in particular in the border states with high diabetes prevalence. In 2005, Texas (67.0 percent) and New Mexico (69.0 percent) reported a higher percentage of foot examinations in the past year than the national level. However, the states of California (62.0 percent), and Arizona (67.0 percent) reported either a small increase or a decline for the same time period. The percentage of foot examinations for diabetics in California was four points less than the national average and five points less than that reported by Texas, with a similar prevalence of individuals with self-reported diabetes.

Recent data showed that the number of persons with diabetes in the United States increased by approximately 50 percent, from 10.1 million in 1997 to

15.2 million in 2004, while the population growth for that same period was only 8 percent (CDC, 1997; CDC, 2005a). The number of ambulatory care visits to physician's offices and hospitals related to diabetes for that same period increased by 41 percent. Population growth, including an increase in elderly and minority populations, predicts a substantial increase in the number of persons with diabetes. Based on data from the 2000 Census Bureau, the number of self-reported people with diabetes predicted for the year 2010 is approximately 14.5 million, and about 17.4 million for the year 2020 (U.S. Census Bureau; Hu et al., 2001). It is predicted that without effective interventions, diabetes prevalence will continue to rise.

Diabetes and Ethnicity

The Hispanic population in the United States is composed of Mexican, Puerto Rican, Cuban and other Latin American populations (Hanis, Hewett-Emmet, Bertin, & Schull, 1991; Idrogo, & Mazze, 2004). In 2000, 35.3 million persons in the United States identified themselves as Hispanic, constituting 12.5 percent of the U.S. population (Grieco & Cassidy, 2001). Hispanics are disproportionately affected by diabetes in the United States (CDC, 1999). Although they comprise the largest minority population in the United States, they are somewhat underserved by the health-care system (Lieu, Newacheck, & McManus, 1993). A recent study using data from the BRFSS survey for the six geographic areas with the greatest proportions of Hispanics (including California, Florida, Illinois, New York, Texas, and Puerto Rico), estimated that, overall, the 1998-2002 self-reported age-adjusted diabetes prevalence among Hispanics was 9.8 percent.

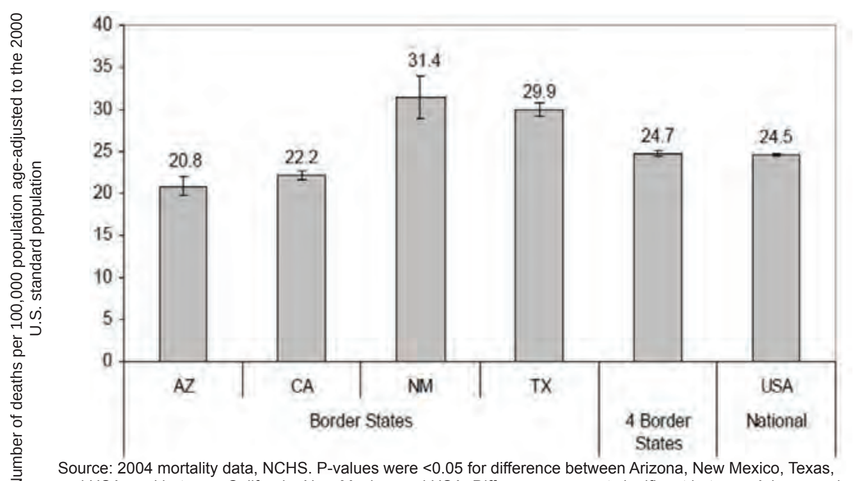
This prevalence was approximately twice the 5.0 percent prevalence among non-Hispanic whites (CDC, 2004b). Furthermore, it is projected that the number of Hispanics diagnosed with diabetes will double between the years 2002 and 2020, whereas the number of non-Hispanic blacks and non-Hispanic whites diagnosed with diabetes will increase by 50 percent and 27 percent, respectively (Hogan, et al., 2003). Diabetes prevalence among non-Hispanic blacks ages 20 years or older is reported to be 11.4 percent (CDC, 2004a; 2005, HHS, 2000).

Mortality

The 2004 age-adjusted diabetes[12] mortality rate per 100,000 population for the combined four border states was 24.7 (0.21). Among the border states, New Mexico reported the highest rate with 31.4 (1.31) deaths per 100,000; followed by Texas 29.9, (0.41), California 22.2 (0.26), and Arizona 20.8 (0.60) (**Figure**

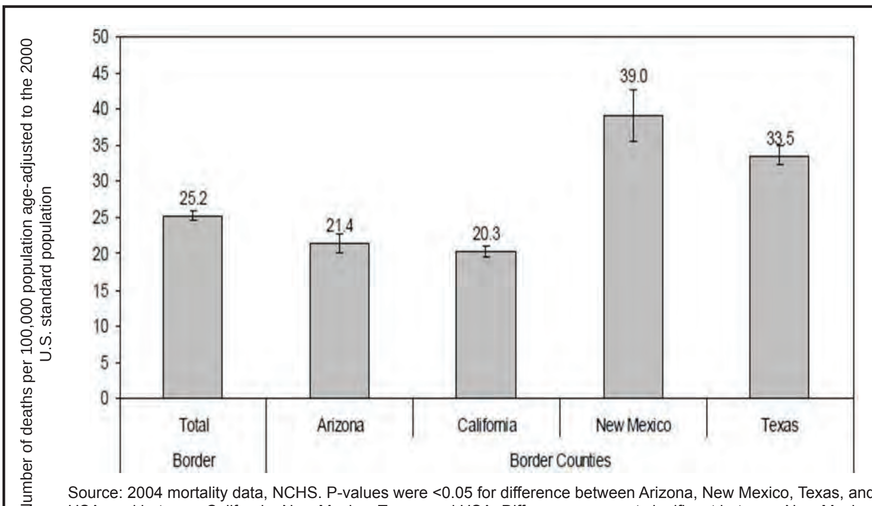
12 Defined by ICD-10: E10-E14 DIABETES MELLITUS

4). Differences in age-adjusted diabetes deaths between the states of New Mexico and California (Z=6.89, p=0.001), as well as New Mexico and Arizona (Z= 1.44, p=0.001) were found to be significantly different. However, no differences were found in mortality rates between the states of New Mexico and Texas (Z=1.09, p=0.27). Among the four border states, the states of New Mexico and Texas had the highest diabetes mortality rates per 100,000 population (31.4 and 29.9 respectively), surpassing the age-adjusted national average of 24.5 per 100,000 population described by Miniño (2007).



Source: 2004 mortality data, NCHS. P-values were <0.05 for difference between Arizona, New Mexico, Texas, and USA, and between California, New Mexico, and USA. Difference were not significant between Arizona and California and between New Mexico and Texas.

***Figure 4*: Age-adjusted mortality rates for diabetes by states, 2004**



Source: 2004 mortality data, NCHS. P-values were <0.05 for difference between Arizona, New Mexico, Texas, and USA, and between California, New Mexico, Texas, and USA. Difference were not significant between New Mexico na and Texas.

***Figure 5*: Age-adjusted mortality rates for diabetes by border counties, 2004**

For the whole cluster of border counties, the 2004 age-adjusted diabetes mortality rate was 25.2 (0.63) per 100,000 population (see **Figure 5**). Among border counties, New Mexico also showed the highest age-adjusted mortality with an age-adjusted rate of 39.0 (3.47) per 100,000 population, followed by Texas 33.5 (1.35), Arizona 21.4 (1.25), and California 20.3 (0.85). Mortality rates were statistically different between New Mexico border counties and California border counties (Z=5.23, p=0.001), and between New Mexico and Arizona border counties (Z= 4.76, p=0.001). No difference was found between age-adjusted mortality rates between New Mexico and Texas border counties (Z=1.47, p=0.14).

For the combined years of 2000 to 2004, National Center for Health Statistics (NCHS) data showed that the specific border county with the highest diabetes mortality rate was the Texas border county of Maverick with a death rate of 55.3 per 100,000 population, while the lowest mortality rate was for the Arizona border county of Yuma with a rate of 16.5 (**Table 1**).

Border	Morality Rate 26.0	Standard Error 0.37
Arizona border	21.0	0.72
Cochise	21.7	2.34
Pima	20.7	0.84
Santa Cruz	18.5	4.16
Yuma	23.5	2.07
California border	19.4	0.48
Imperial	28.5	2.83
San Diego	19.0	0.49
New Mexico border	37.9	1.98
Dona Ana	50.0	3.29
Otero	28.2	3.87
Texas border	38.1	0.84
Cameron	40.1	2.09
El Paso	45.3	1.66
Hidalgo	34.5	1.57
Maverick	35.4	5.55
Starr	19.1	3.92
Val Verde	27.2	4.56
Webb	43.2	3.30

***Table 1*: Age adjusted mortality rates for diabetes by selected border counties for the years 2002-2004**

Source: 2002-2004 mortality data, NCHS

Diabetes Mortality and Age

Age-specific diabetes mortality rates for 2004 showed that the mortality rate per 100,000 population increased by age and was consistently higher for the border states of Texas and New Mexico (**Figure 6**). This trend was replicated in the border counties (**Figure 7**).

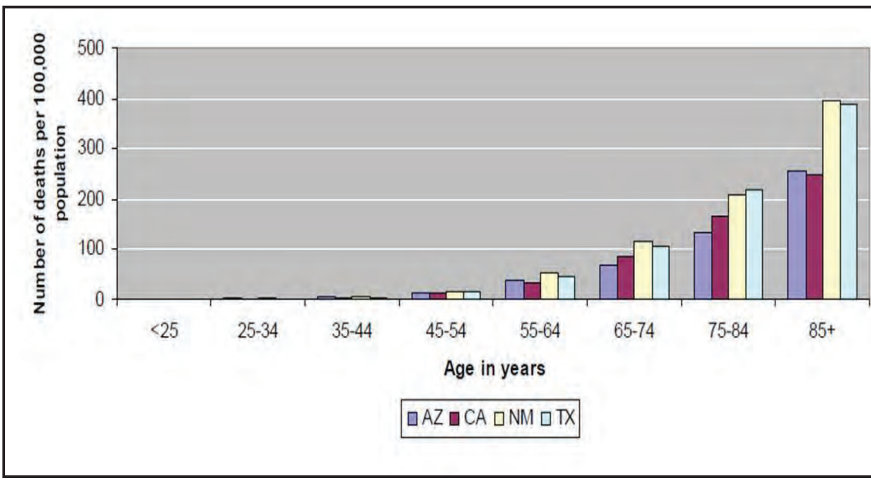


***Figure 6*: Mortality rates for diabetes by state and age group, 2004**

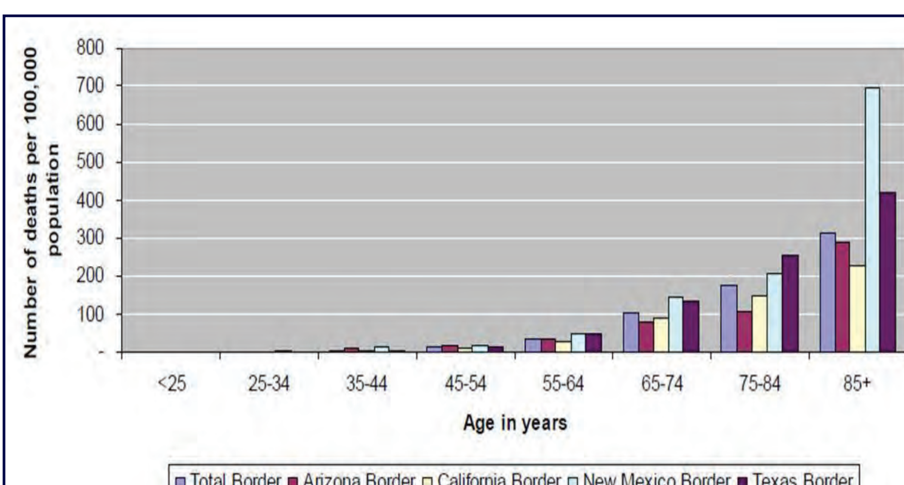


***Figure 7*: Mortality rates for diabetes by border counties and age group, 2004**

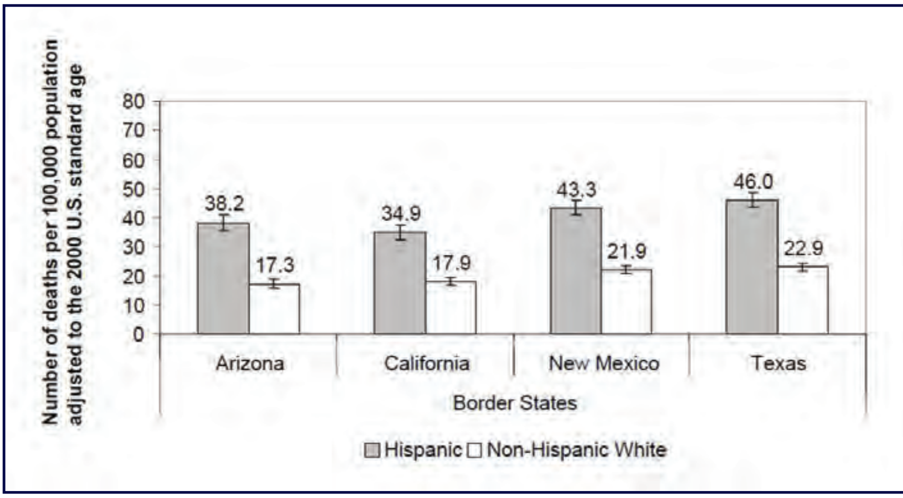


***Figure 8*: Age-adjusted mortality rates for diabetes by race and state, 2004**

Diabetes Mortality and Ethnicity

The 2004 age-adjusted diabetes mortality rates for Hispanics were almost double the rates for non-Hispanic whites. Rates were higher for the states of Texas and New Mexico: 46.0 (1.17), and 43.3 (2.76) for Hispanics, and 23.0 (0.43) and 21.9 (1.42) for non-Hispanic whites, respectively (**Figure 8**). This trend was also found in Arizona, with a diabetes mortality rate of 38.2 (2.67) for Hispanics and 17.3 (0.61) for non-Hispanic whites, and in California with an age-adjusted rate of 34.9 (0.85) for Hispanics and 18.0 (0.30) for non-Hispanic whites. The age-adjusted diabetes mortality rate for the combined border counties was nearly two times higher for Hispanics [38.4 (1.61)] than for non-Hispanic whites [17.8 (0.93)] and this difference was significantly different (z=11.01, p=0.001; **Figure 9**).

New Mexico border counties had the highest age-adjusted diabetes mortality rates for Hispanics of 49.5 (7.61) per 100,000 population, and 33.5 (5.05) for non-Hispanic whites (p = 0.079) (Figure 5). Diabetes mortality rates for the Texas border counties were 39.2 (2.12) for Hispanics and 20.5 (2.70) for non-Hispanic whites (Z=5.45, p=0.001). Arizona border counties had a mortality rate of 36.6 (4.73) for Hispanics and 16.8 (1.70) for non-Hispanic whites (Z =3.94, p=0.001). California border counties reported the lowest diabetes age-adjusted mortality rate for Hispanics in the border region with 33.8 (3.49), and 16.4 (1.20) deaths per 100,000 for non-Hispanic whites (Z =4.72, p=0.001). Mortality rate differences between Hispanic and non-Hispanic whites between border counties were statistically significant. The appendix to Chapter 7 provides additional information on diabetes mortality trends for the years 1998, 2000, 2002, and 2004.

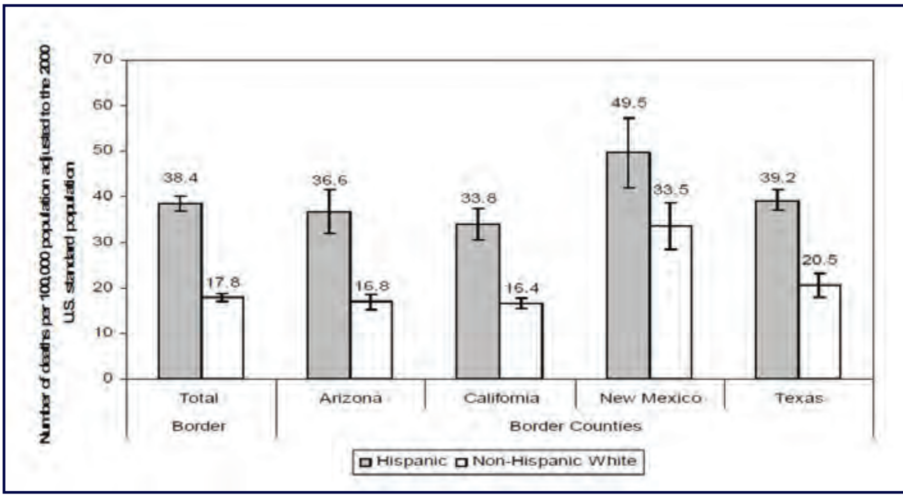


***Figure 9*: Age-adjusted mortality rates for diabetes by race and border county, 2004**

Diabetes Hospitalization along the Border

People with diabetes are more likely to be hospitalized and incur nearly twice the total inpatient costs per capita of people without diabetes (Jiang, Stryer, Friedman, & Andrews, 2003). Hospitalization rates due to diabetes vary by age, race/ethnicity and other factors. In a study by Albertorio-Diaz, Notzon, and Rodriguez-Lainz (2007), 2000 age-adjusted diabetes hospital discharge rates were compared for the states of California, Arizona, and Texas (authors were unable to obtain data from the state of New Mexico). Records were obtained from the corresponding health departments and represented data from licensed inpatient hospitals. Diabetes hospitalization discharge was identified using the definition provided by the Healthy Border 2010 report, (U.S.-Mexico Border Health Commission, 2003). Diabetes hospitalization was defined as subjects who had been admitted as inpatients to these facilities with a first-listed diagnosis of diabetes (ICD-9 CM code 250) and who had been subsequently discharged. Discharges were classified in two groups (border counties and non-border counties) based on the patient's county of residence.

The authors identified a total of 86,198 hospital discharge records from these three states that satisfied the diabetes criteria (1.2 percent of the total number of discharges). Hospital discharge data showed that the age-adjusted rate per 10,000 population was 17.0 (0.10) for the state of Texas, while California and Arizona had a hospital discharge rate of 14.2 (0.07) and 13.4 (0.16) respectively.

The age-adjusted diabetes hospital discharge rate for the Texas border counties was 26.1 (0.39) while the rates for Arizona and California border counties were

14.9 (0.35) and 11.5 (0.20) respectively. These rates were significantly different between the states of Texas and Arizona (z=21.37, p=0.001) and between Texas and California (z= 33.31, p=0.001).

The state of Texas had the highest age-adjusted diabetes discharge rate for males at 17.1 (0.14), and females at 16.9 (0.13) per 10,000 population, followed by the state of California with 15.9 (0.11) for males and 12.8 (0.09) for females. Arizona had a discharge rate of 14.7 (0.25) for males and 12.2 (0.22) and females.

The age-adjusted discharge rate for males in the border counties of Texas was 28.0 (0.60) while the discharge for females was 24.6 (0.51) per 10,000. The discharge rates for the border counties of Arizona were 15.7 (0.53) for males and 14.1 (0.48) for females, and 13.5 (0.33) and 9.7 (0.26) for males and females for the border counties of California.

Diabetes discharge by ethnicity

Similar differences were seen by state and border counties for Hispanics and non-Hispanics, with the former having higher age-adjusted diabetes discharge rates than non-Hispanics. At the state level, Texas reported the highest age-adjusted discharge rate for Hispanics of 26.8 (0.28) per 10,000 population. The state of Arizona had the next highest level at 23.8 (0.64), followed by California at 23.0 (0.22). The age-adjusted diabetes discharge rates for non-Hispanics were 15.5 (0.11), 13.7 (0.19), and 15.0 (0.09) for Texas, Arizona, and California, respectively. Within the border counties, Texas again reported the highest age-adjusted diabetes discharge rate for Hispanics of 32.1 (0.51) per 10,000, followed by Arizona 21.6 (0.96), and California 21.5 (0.72). The age-adjusted rates for non-Hispanics who lived in the border counties were 13.6 (0.61), 15.1 (0.44), and 11.1 (0.24) for Texas, Arizona, and California, respectively.

The authors cited possible limitations to their study, such as subjects' access to hospital care and repeated hospitalizations of some individuals, as well as limitations related to the type and the form of the data collected through the different hospital systems.

Discussion

Mortality

Results showed that, in 2004, New Mexico and Texas had the highest diabetes mortality rates among the border states, surpassing the national average. New Mexico and Texas had the highest diabetes mortality rates, as shown when data were analyzed by age and race, with Hispanics having higher rates than non-Hispanic whites. These differences may suggest variations in the presence of factors that contribute to the morbidity and mortality from diabetes including diet, level of physical activity, access to health care, and other genetic or environmental risk factors.

Results from our study show that diabetes mortality rates were higher for the states of Texas and New Mexico, as well as for the border counties of these states. Mortality rates in this area were also higher for Hispanics than for non-Hispanic whites. In addition, hospital discharge rates were higher for males than for females in all border states.

Hospitalization

Texas reported the highest diabetes hospital discharge rate at either the state or border county level. Consistent with previous literature, males had higher hospital discharge rates than females.

Hispanics had a higher diabetes hospitalization discharge rate than non-Hispanics along the border. This finding was consistent in the three clusters of border counties under review. Again, Texas border counties showed an alarmingly high rate of diabetes discharges.

Recommendations to Address Diabetes along the Border

The prevalence of diabetes in the United States is increasing. With a current prevalence of 6.3 percent, which is projected to double by the year 2020, diabetes is a serious public health problem. In addition, diabetes is associated with many health complications which exacerbate the scope of the problem. The increase in lifespan and growth of minority populations contribute to higher diabetes rates at the border.

Based on our analysis, we have divided our recommendations into three main strategies: (a) research, (b) public health intervention, and (3) policy making. Augmenting current efforts in all three of these areas is necessary to alleviate diabetes morbidity and mortality and to lessen the diabetes burden in the U.S.-Mexico border area.

Research

While advances have been achieved in diabetes research, it is still necessary to increase and supplement several lines of diabetes research, specifically in the areas of diabetes prevention, early diagnosis, appropriate diabetes treatment and management, progress of epidemiology, and surveillance systems. Emphasis should also be placed on enhancing transitional research that can contribute to the areas of diabetes prevention and early intervention programs in the United States as well as those across the border with Mexico. Research should also target the areas of comorbidity with other conditions such as tuberculosis and diabetes. Moreover, the association between diabetes and depression is an important area of research in need of further exploration.

Public health interventions

One of the essential functions of public health is to create and strengthen collaborations between the different sectors of the community and public health organizations. These collaborations should focus on programs that expand community-based health promotion, education, nutrition, and physical activity. Measures aimed at prevention and management of diabetes must include people of all ages and from a variety of backgrounds including racial, ethnic, and religious groups, while giving consideration to their unique needs. Institutions such as schools, workplaces, and churches should be integrated into these health programs. These programs should have measurable outcomes to evaluate their progress and sustainability and, whenever possible, follow already published guidelines like those published by the Centers for Disease Control and Prevention and the National Institutes of Health National Diabetes Education Program.

Policy

It is important to establish awareness among policy makers, public health professionals, and other stakeholders who have an integral role in policy development of the importance of diabetes as a public health problem. Policies should be developed that focus on strengthening advocacy on behalf of people afflicted with diabetes. Such policies should include (a) campaigns to increase awareness among the public of the seriousness of diabetes; (b) an increase in prevention initiatives that support policies and programs aimed at screening, health and nutrition education, promotion of physical activity, and self-management, and (c) health insurance programs that are aimed at preventive care and assure access to health-care providers, thus allowing enrollees to receive quality treatment and management. These policy recommendations should be implemented in a binational context in order to assure regional impact, as well as to influence the population who live along the U.S.-Mexico border.

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CHAPTER 8

HEART DISEASE AND STROKE

Heart disease and stroke are the leading causes of illness and death in both the United States and the U.S.-Mexico border region. Heart attack and stroke are the principal outcomes of cardiovascular disease, defined by the National Heart, Lung, and Blood Institute (NHLBI) as diseases and injuries of the heart, blood vessels of the heart, and the system of blood vessels throughout the body, including the brain (2007). This chapter offers a review of the available information on heart disease and stroke in the border region, including morbidity and mortality levels and trends, as well as the prevalence of risk factors.

Understanding Heart Disease and Stroke

Cardiovascular diseases result from a variety of factors: Ischemia refers to the lack of oxygen in tissues due to obstruction of blood flow — in this case to the heart or brain. Ischemia can result from atherosclerosis, a term referring to the thickening and hardening of the arteries (National Heart, Lung, and Blood Institute [NHLBI], 2006). Atherosclerosis involves the buildup of fatty plaque and other substances in arterial walls. Continued growth of plaque will reduce blood flow through the artery; blood clots can also develop at the site of plaque. Narrowing of the coronary arteries that feed the heart, known as coronary artery disease, can cause insufficient blood flow to the heart, leading to angina or chest pain. Blood clots in the coronary arteries that cut off most or all blood flow to a section of the heart will cause permanent damage to the heart muscle – that is, a heart attack or myocardial infarction. This in turn can lead to congestive heart failure, heart arrhythmias, or sudden cardiac death. Blood clots in the arteries supplying the brain can block blood supply to a section of the brain, leading to an ischemic stroke (NHLBI, 2006).

Hypertension, or high blood pressure, is a major factor in the development of heart disease and stroke (NINDS, 2004). Hypertension can cause injuries to the arterial walls, beginning the process of atherosclerosis. Hypertension results from muscular constriction of small arteries, in most cases of unknown cause. This increased workload can cause the heart to enlarge and weaken, increasing the risk of congestive heart failure and heart attack. In the brain, hypertension can lead to arterial hemorrhage, producing a hemorrhagic stroke or arterial blockage producing an ischemic stroke. Cerebrovascular disease includes both hemorrhagic stroke and ischemic stroke.

Heart Disease, Stroke, and Healthy Border 2010

Healthy Border 2010 is designed to address some of the leading health problems on the U.S.-Mexico border, and in particular to eliminate health disparities (U.S.-Mexico Border Health Commission, 2003). None of the Healthy Border 2010 program's 20 objectives directly focus on cardiovascular disease because observed heart disease and stroke death rates for the border are lower than U.S. national rates. However, heart disease and stroke remain two of the leading causes of death for border residents.

The Healthy Border 2010 objectives, as well as those of the Healthy Gente 2010 program (Arizona Office of Border Health, 2004), include several of the most important risk factors for cardiovascular disease. These include reducing deaths and hospitalizations due to diabetes; reducing obesity, that is, the proportion of the population with a body mass index of 30 or more; and reducing tobacco consumption among adults and teenagers. Improvements in these areas will certainly reduce deaths and disabilities due to cardiovascular disease. However, development of additional Healthy Border objectives directly focused on cardiovascular disease could reduce its impact even further and be an important step toward elimination of health disparities related to heart disease and stroke in the border population.

Levels and Trends in Heart Disease and Stroke

Heart disease and stroke are the first and third leading causes of death, respectively, in the United States (NHLBI, 2007). These diseases also rank as the first and third leading causes of death for the four U.S. border states and the 44-county border region. Heart disease and stroke are also important causes of disability. Heart disease was the third leading chronic condition causing activity limitation in 2000, affecting 4.4 million persons in the United States. Stroke was the cause of disability in an additional 1.6 million people. Combined, heart disease and stroke caused more disability than any other chronic conditions.

These two diseases are also major contributors to rising health-care costs. Their impact on health-care expenditures arises not only from extended hospital stays, but also from expensive medical procedures and the use of costly medications requiring lengthy regimens. The estimated economic cost of cardiovascular disease for 2007 was about $432 billion, of which $283 billion was for direct health expenditures (NHLBI, 2007).

In 2004, heart disease accounted for more than 650,000 deaths in the United States, about 27 percent of all deaths. **Table 1** shows deaths and death rates due to cardiovascular disease and stroke for the United States and the border region. Heart disease was the cause of about 11,900 deaths on the border in 2004, or about 26 percent of all deaths. Although the proportion of deaths due to heart disease was about the same for the United States and the border region, the age-adjusted death rate for heart disease was 14 percent lower for border residents. The age-adjusted stroke death rate was 11 percent lower on the border. Heart disease death rates were much lower for women than men in both the United States (34 percent lower) and the border region (37 percent lower). The stroke death rate was 3 percent lower for women than men at the national level, but the female-male difference was not statistically significant for border residents. The border counties of Texas had the lowest heart disease rates and California border counties had the highest, but the difference was not statistically significant. The stroke death rate was lowest in the Texas border region and highest for California border residents.

	Heart Disease Deaths and Death Rates				Stroke Deaths and Death Rates			
	Number	Percent	Age-adjusted rate*	CI**	Number	Percent	Age-adjusted rate*	CI**
United States								
Total	652,486	27.2	217.0	(216.4, 217.5)	150,074	6.3	50.0	(49.7, 50.2)
Male	321,973	27.2	267.9	(267.0, 268.8)	58,800	5.0	50.4	(50.0, 50.8)
Female	330,513	27.2	177.3	(176.7, 177.9)	91,274	7.5	48.9	(48.6, 49.2)
Border Counties								
Total	11,926	26.2	185.8	(182.5, 189.2)	2,848	6.3	44.4	(42.8, 46.1)
Male	6,363	26.9	234.6	(228.8, 240.4)	1,165	4.9	43.7	(41.2, 46.3)
Female	5,563	25.6	146.7	(142.8, 150.5)	1,683	7.7	44.3	(42.2, 46.5)
AZ border	2,572	24.5	184.6	(177.4, 191.7)	620	5.9	44.2	(40.8, 47.7)
CA border	5,506	26.4	190.5	(185.5, 195.6)	1,499	7.2	51.8	(49.1, 54.4)
NM border	589	25.5	180.5	(165.8, 195.2)	125	5.4	38.9	(32.0, 45.7)
TX border	3,259	27.7	180.0	(173.8, 186.2)	604	5.1	33.4	(30.8, 36.1)

***Table 1*: Cardiovascular disease deaths and death rates, United States and U.S.-Mexico border counties, 2004**

Source: National mortality files, NCHS/CDC
*Rates per 100,000 population,age-adjusted to U.S.2000 standard population
**95 Percent confidence interval

Lower heart disease death rates for Hispanics, including Mexican-Americans, as compared to non-Hispanic whites, have been observed in many studies (Becker, 1988; Cooper, 2000; Liao, 1997; Sorlie, 1993). Some of these studies were based on aggregate data, using death certificate data combined with population data from the U.S. Census (Becker, 1988; Cooper, 2000). Others used the National Death Index to track individuals participating in national surveys or in cohort studies (Liao, 1997; Sorlie, 1993). Both types of studies reached the same conclusion: death rates due to heart disease were notably lower for Hispanics than for non-Hispanic whites.

This large mortality advantage for Hispanics, combined with high levels of some risk factors such as diabetes and obesity and low socioeconomic status, has been termed the "Hispanic paradox."

However, a number of studies have provided evidence against the Hispanic paradox (Hunt 2002, 2003; Palloni, 2004; Patel, 2004; Poe, 1993; Stern, 1999; Swenson, 2002). Several of these reports were based on data from the San Antonio Heart Study, a cohort study that determined the vital status of participants through links to the National Death Index and via active follow-up. The studies showed that Mexican-American participants were at equal or greater risk of death due to cardiovascular disease or to all causes, as compared to non-Hispanic whites, after correcting for the undercount of Hispanic deaths using the National Death Index, and adjusting for age, sex, and possible confounders (Hunt 2002, 2003; Patel, 2004; Stern, 1999).

The authors argue that studies based on aggregate data understate Hispanic mortality because of discrepancies in ethnic classification and incomplete death registration. Errors in identification of ethnicity arise because the aggregate data are based on both death registration and Census figures, and only in the Census is ethnic identity obtained directly from the respondent. They also suggest that death registration for Hispanics may be incomplete due to return migration to the country of origin of immigrants in poor health. Cohort studies using the National Death Index alone may underestimate Hispanic mortality because of challenges in matching Hispanic participants to the National Death Index. These problems include missing or inaccurate social security numbers for undocumented Hispanics or those involved in agriculture or domestic service, as well as Hispanic naming conventions that affect how names are reported to survey interviewers and on death certificates (Patel, 2004). Of the remaining studies, one used mathematical modeling to test various hypotheses regarding the Hispanic paradox and concluded that return migration of foreign-born immigrants likely accounts for the lower mortality rate of this group (Palloni, 2004).

Another cohort study of Hispanics and non-Hispanic whites, the San Luis Valley Diabetes Study, provided mixed findings regarding the Hispanic advantage in mortality due to cardiovascular disease or to all causes (Swenson, 2002). Among study participants who did not have diabetes, the mortality rates for all causes combined, cardiovascular disease and coronary heart disease were not significantly different for Hispanics and non-Hispanic whites. Among study participants who had diabetes, the Hispanic mortality rate for all causes was not significantly different from the non-Hispanic white rate. For males with diabetes, however, the cardiovascular disease mortality rate for Hispanics was significantly lower than for non-Hispanic whites.

Figure 1 provides age-adjusted death rates due to heart disease and stroke by ethnicity for the United States and the border region in 2004. At both the national level and on the border, heart disease and stroke death rates were significantly lower for Hispanics. For the United States, the Hispanic rate for heart disease was 21 percent lower than for non-Hispanic whites, while in the border region the Hispanic rate was 15 percent lower than the non-Hispanic white rate. The heart disease death rate for border Hispanics was higher than the national Hispanic rate (166.8 versus 158.4), although the difference was just shy of statistical significance. For non-Hispanic whites, the national and border heart disease death rates were not significantly different. It is worth noting, however, that mortality data combine information from death certificates and the Census, and so death rates for specific ethnic groups are subject to the same ethnicity classification errors mentioned above regarding aggregate data.

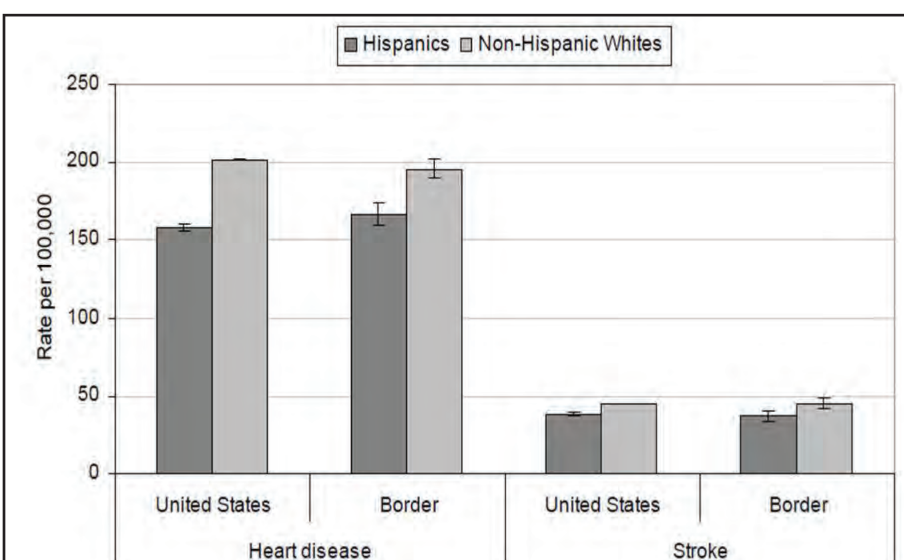

Figure 1**: Age-adjusted death rates* due to heart disease and stroke by ethnicity, United States and border region, 2004**

Source: National mortality files, NCHS/CDC
*Rates adjusted to U.S. 2000 standard population.

Trends in Heart Disease and Stroke

Heart disease and stroke death rates have been decreasing in the United States for several decades. Between 1972 and 2004, the coronary heart disease death rate fell by 66 percent (NHLBI, 2007). Between 1990 and 2004, the national heart disease death rate dropped by 32 percent, and the stroke death rate fell by 23 percent. Heart disease death rates fell for all racial groups and genders, although the declines were greater in some groups than others.

As illustrated by **Figure 2**, death rates due to heart disease and stroke fell sharply between 1990 and 2004 for the border population. For both men and women the heart disease death rate fell by nearly one-third, approximating the decline in national death rates. Stroke death rates in the border region fell at nearly the same pace, dropping by 27 percent for men and 29 percent for women. Nationally, the stroke death rate fell by about the same amount for men, but for women the decline was somewhat smaller (21 percent). Trends in heart disease and stroke death rates were approximately the same for border Hispanics and non-Hispanic whites.

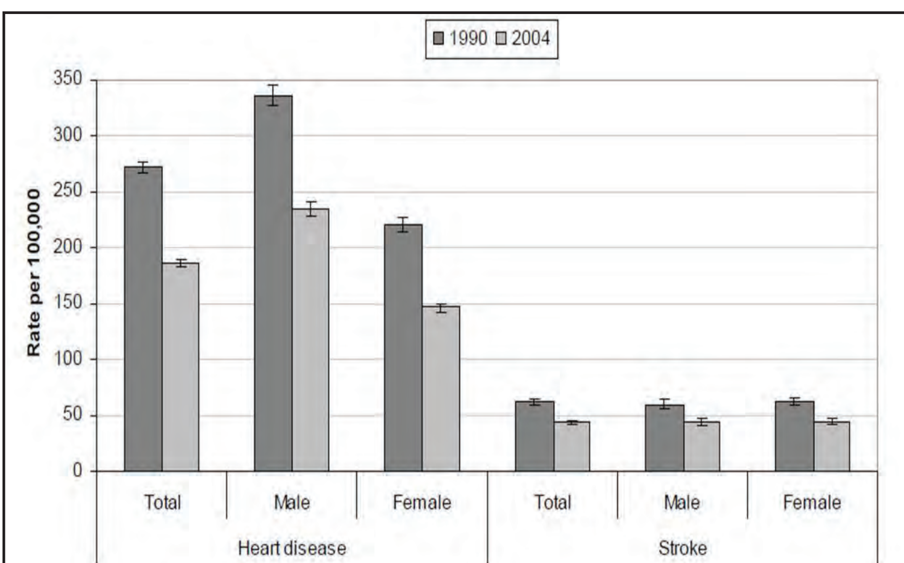

***Figure 2*: Trends in age-adjusted* death rates due to heart disease and stroke, U.S.-Mexico border, 1990-2004**

Source: National mortality files, NCHS/CDC
*Rates adjusted to U.S. 2000 standard population

Age Patterns in Heart Disease and Stroke

Cardiovascular disease and death rates rise sharply with age and are particularly high among those aged 65 and older. Heart disease death rates begin rising at an earlier age among men than women, but the rates for both sexes reach significant levels by age 65 and rise substantially in the years beyond (NHLBI, 2007). **Figure 3** shows age-specific death rates by sex for U.S. counties on the U.S.-Mexico border; similar patterns exist for the United States. Stroke death rates also increase rapidly among persons aged 65 and older. The age pattern of these diseases has important implications, as the population of both the United States and the border are rapidly aging. In 2000, about 12.4 percent of the U.S. population was aged 65 years or more, and this proportion is expected to reach 19.7 percent by 2030 (U.S. Census Bureau, 2005). Population projections by age are not available for the border counties, but in the four border states the percent of the population aged 65 or more will grow from 10.6 percent in 2000 to 17.7 percent in 2030. Heart disease and stroke deaths on the border account for 30 percent of all deaths among persons aged 65 to 74 years, and 44 percent of deaths among those aged 85 years or more. Thus, the rapidly growing elderly population means that, even with continuing declines in cardiovascular death rates among people of all ages, the number of heart disease and stroke deaths may increase substantially in the future. This will present a particular challenge for already overburdened health care providers and health facilities in the border region.

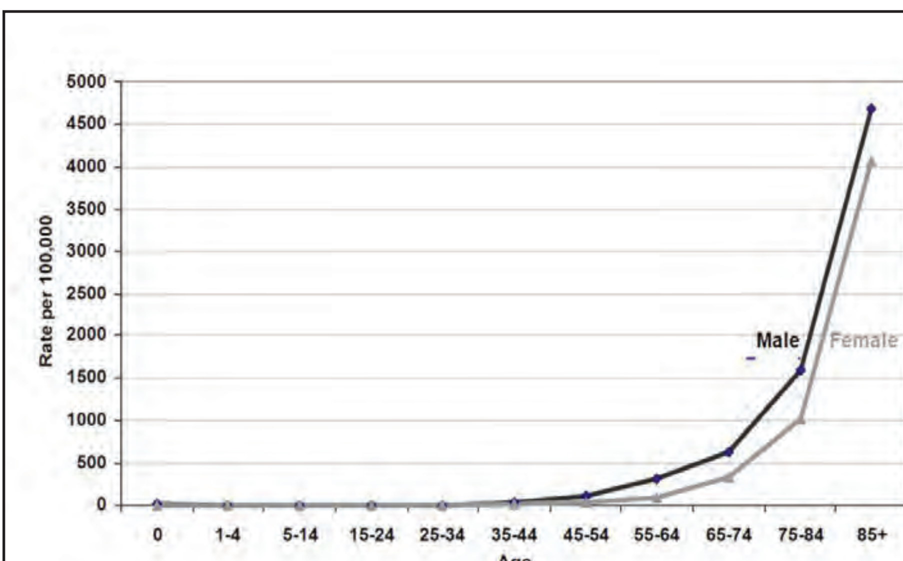

***Figure 3*: Age-specific death rates due to heart disease, U.S.-Mexico border counties, 2004**

Source: National mortality files, NCHS/CDC

Heart Disease and Stroke Morbidity

In 2004, nearly 16 million people nationwide were estimated to have coronary heart disease, the most important component of heart disease, and nearly 6 million to have cerebrovascular disease (NHLBI, 2007). Some information is available on heart disease and stroke morbidity for the border region as well. Data for the 44 border counties plus Maricopa County, Arizona, were produced by combining data from the 2000-2003 years of the National Health Interview Survey (NHIS), which produced a total of 5,139 interviews with adults aged 18 or more years (Albertorio, 2008). The NHIS collects information from respondents about a variety of cardiovascular diseases or conditions, including angina, coronary heart disease, heart attack, and stroke. The combined data showed rates for each of these diseases were low for border residents, ranging from one to three percent. Differences between Hispanic and non-Hispanic rates for the border population were small and not statistically significant; the same was true for differences between the border rates and national rates.

Statewide data are available on hospitalizations for three of the four border states: Arizona, California, and Texas (Arizona Department of Health Services, 2000; California Office of Statewide Health Planning and Development, 2004; Texas Health Care Information Council, 2001). Combining these data sources provided some information on hospital-based care for heart disease and stroke in the border region. Based on age-adjusted rates per 10,000 population, the discharge rate for heart disease for the border counties was significantly lower than for the non-border regions of those states, 114.9 versus 128.4. Comparison of these figures to results from the National Hospital Discharge Survey (HDS) shows that the border and non-border rates from the three border states were lower than the national rate of 157.7 for heart disease, but higher than the discharge rate of 96.8 for the Western region of the United States (Kozak, 2002). The Western region as defined by the HDS includes both California and Arizona. The hospital discharge rate for acute myocardial infarction (AMI) was similar in the border and non-border regions of Arizona, California, and Texas (19.9 versus 22.1). The border and non-border AMI discharge rates were significantly lower than the national rate of 28.1, but were similar to the rate for the Western region, 19.4.

The discharge rate for cerebrovascular disease, including hemorrhagic and ischemic stroke, was significantly lower for border residents of the three states than for non-border residents (28.0 versus 34.0). The rate for border residents was also lower than the national rate of 35.0, but it was higher than the rate in the Western region, where it was 23.9.

While lower discharge rates for cardiovascular diseases might be attributed to poorer access to care on the border, the border discharge rate remained lower than the non-border rate even for acute myocardial infarctions, a diagnosis that usually requires hospitalization. The lower discharge rate could be due to lower rates of heart disease, which would conform with the lower death rates due to heart disease for border residents. However, lower discharge rates also could be explained by a greater likelihood of border residents to die from heart disease or stroke without being hospitalized, or a greater likelihood to die during or following hospitalization, thus eliminating rehospitalization for future treatment of the same condition (Goff, 1994; Hunt, 2003; Pandey, 2001).

The hospital discharge databases also provide information on the use of cardiovascular procedures during hospitalization. Coronary artery bypass grafts are widely used in the United States to open the severely occluded (blocked) coronary arteries. The national bypass rate was 18.7 bypass grafts per 10,000 persons in 2000 (Kozak, 2002). Hospital discharge data for Arizona, California and Texas showed the bypass rate for their border counties was lower than the national rate, at 10.1 grafts per 10,000 border residents. The non-border counties of the three states reported higher bypass rates, at 11.7 per 10,000. Atherosclerosis can also be addressed by angioplasty (insertion and inflation of a balloon within the artery) and the use of stents to keep the artery open. Angioplasties were performed in the border counties at the rate of 18.5 per 10,000, compared to a rate of 19.9 in the non-border counties of the three states and 36.9 for the entire U.S. population.

Cardiovascular Disease Risk Factors

The primary risk factors for heart disease and stroke are hypertension (high blood pressure), cigarette smoking, high blood cholesterol, overweight and obesity, physical inactivity, and diabetes (U.S. Department of Health and Human Services [HHS], 2000). This section provides an overview of the prevalence levels of each cardiovascular disease risk factor at the border and nationally, the need for screening, and various means of addressing those risk factors.

Primary prevention of cardiovascular diseases, in particular through lifestyle interventions, is recommended by organizations such as the American Heart Association (2007). Primary prevention is also the cornerstone of the Healthy People 2010 objectives regarding heart disease and stroke (HHS, 2000). Medications and/or surgery can be used to address risk factors such as hypertension or high blood cholesterol, as well as for the treatment of cardiovascular disease. Referral of individuals for medical care, however, depends on screening to identify risk factors or the early stages of cardiovascular disease. This is one of the great challenges for the border as low rates of health insurance coverage and the limited availability of health facilities and personnel limit both screening and provision of medical treatments.

Hypertension

High blood pressure, or hypertension, is a major risk factor for both heart disease and stroke (NINDS, 2004). Hypertension is defined as blood pressure of greater than 140 mm Hg systolic (the pressure when the heart pumps) and 90 mm Hg diastolic (the pressure when the heart relaxes), usually noted as 140/90 mm Hg. People who are taking antihypertensive medication are also considered hypertensive, even if their blood pressure falls below these numbers.

Studies identifying the importance of blood pressure for cardiovascular health have led to large and sustained public health campaigns, beginning in the 1990s, to educate the public about the risks of high blood pressure (Roccella, 1998). About 90 percent of adults now have their blood pressure checked at least once every two years. The proportion of people with hypertension who were able to control their blood pressure via medication and lifestyle changes rose from 16 percent in 1971-72 to about 65 percent in 1988-1994 (HHS, 2000). The overall prevalence of hypertension fell nationally from 32 percent in 1976-1980 to 22 percent in 1988-1994, but rose to 28 percent in 1999-2000 and remained at that level through 2006 (Ostchega, 2008).

The prevalence of hypertension in Mexican-Americans is surprisingly low, despite high levels of risk factors such as diabetes, obesity and low socioeconomic status. Analysis of national data from the National Health and Nutrition Examination Survey (NHANES) showed the age-adjusted prevalence of hypertension in Mexican-Americans was 21.3 percent in 1988-91, similar to the level in non-Hispanic whites (19.2 percent) and much lower than among blacks (30.2 percent); (Centers for Disease Control and Prevention [CDC], 1995). A number of other studies have documented low rates of high blood pressure in Mexican-Americans, despite high rates of risk factors for hypertension (Haffner, 1993; Sorel, 1991; Stern 1981; Winkleby, 1998). The good performance of Mexican-Americans on this health measure has contributed to the debate about the Hispanic paradox.

However, further work in this area has shown that relatively low levels of hypertension prevalence do not necessarily translate into high levels of hypertension control. Several studies have reported that, compared to non-Hispanic whites and non-Hispanic blacks with hypertension, Mexican-Americans with high blood pressure are less aware of their condition, a smaller percentage are under treatment, and a lower proportion have their blood pressure under control (CDC, 1995, 2005; Haffner, 1993). **Figure 4** depicts levels of hypertension prevalence, awareness, treatment and control among different ethnic groups in the United States. Hypertension-related mortality in Mexican-Americans rose by 31 percent from 1995-2002, a greater level of increase than among non-Hispanic whites (27 percent; CDC, 2005). Limited information is available concerning hypertension among residents of the U.S.-Mexico border region. However, combining data from the 2000-2003 NHIS provides one estimate. The NHIS data indicate that, among the border population aged 18 years or more, 20.6 percent (age-adjusted) had been

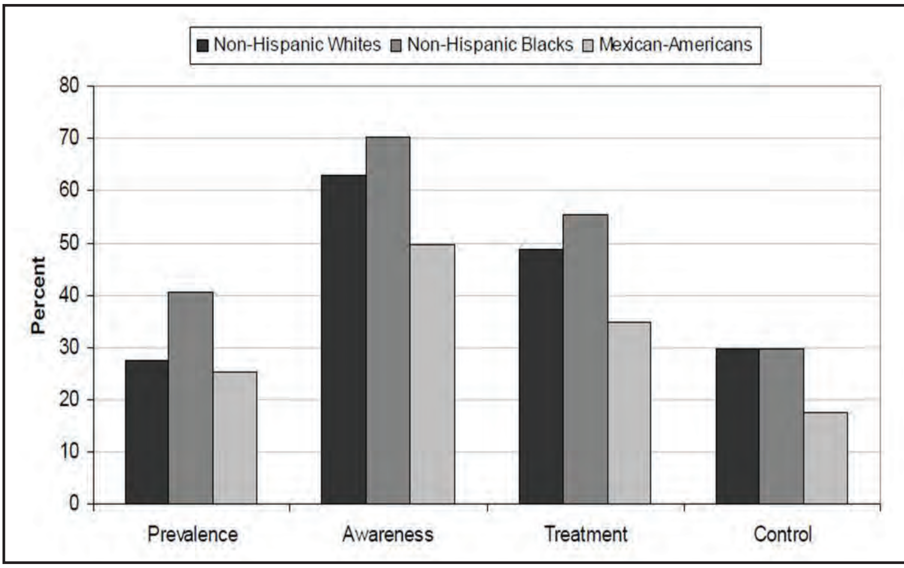

***Figure 4*: Levels of hypertension prevalence, awareness, treatment, and control, United States 1999-2002**

Source: CDC. Racial/ethnic disparities in prevalence, treatment, and control of hypertension – United States, 1999-2002. MMWR 2005; 54:7-9.

diagnosed with high blood pressure. Of Hispanics in the border region, 22 percent had been diagnosed with high blood pressure, compared to 20 percent of non-Hispanics, a difference that was not statistically significant (Albertorio, 2008). This estimate is similar to that of the 2004 Texas BRFSS, which surveyed respondents in three border counties of that state. In the Texas study, 21 percent of adults aged 18 years or more reported doctor-diagnosed hypertension.

Smoking

Cigarette smoking is the most powerful modifiable risk factor for both heart disease and stroke. Cigarette smoke has been shown to cause coronary heart disease in both smokers and in non-smokers exposed to second-hand smoke (HHS, 1989, 2006). Other conditions caused by cigarette smoking include arteriosclerotic peripheral vascular disease, and stroke, probably as a result of increased atherosclerosis, increased thrombosis or blood clots, production of heart arrhythmias, and reduced oxygen delivery (HHS, 1990). Smoking is directly responsible for a larger proportion of stroke in younger adults than in older adults, and heavy smokers are at greater risk than light smokers. Smoking increases the risk of stroke by increasing atherosclerosis and by raising the level of blood-clotting factors such as fibrinogen (NINDS, 2004). Compared to lifetime non-smokers, smokers have twice the risk of dying from coronary heart disease and twice the risk of dying from stroke.

Smoking cessation produces immediate health gains, and these gains gradually increase with long-term abstinence. The excess risk of death from coronary artery disease is reduced by about half after one year of smoking abstinence. After 15 years of abstaining from smoking, a former smoker's risk of coronary heart disease and death from all causes is similar to lifetime non-smokers. Stroke risk decreases dramatically after two to four years of abstinence from smoking, and after 15 years the risk level is similar to those who have never smoked.

The national prevalence of cigarette smoking among adults aged 18 years or more declined during the 1990s and early 2000s from 27 percent in 1992, to 23 percent in 2000, and 21 percent in 2004 (NCHS). Annual reductions in smoking prevalence have been somewhat larger in more recent years. Rates of cigarette smoking have also declined for various race/ethnicity groups, including Hispanics and Mexican-Americans. **Figure 5** displays current differences in age-adjusted smoking rates and smoking status by race and ethnicity in 2004. Not only were cigarette smoking rates lower for Hispanics and Mexican-Americans, but the proportion of every-day smokers was much smaller, indicating a lower level of tobacco consumption among Hispanic and Mexican-American smokers (Lethbridge, 2004).

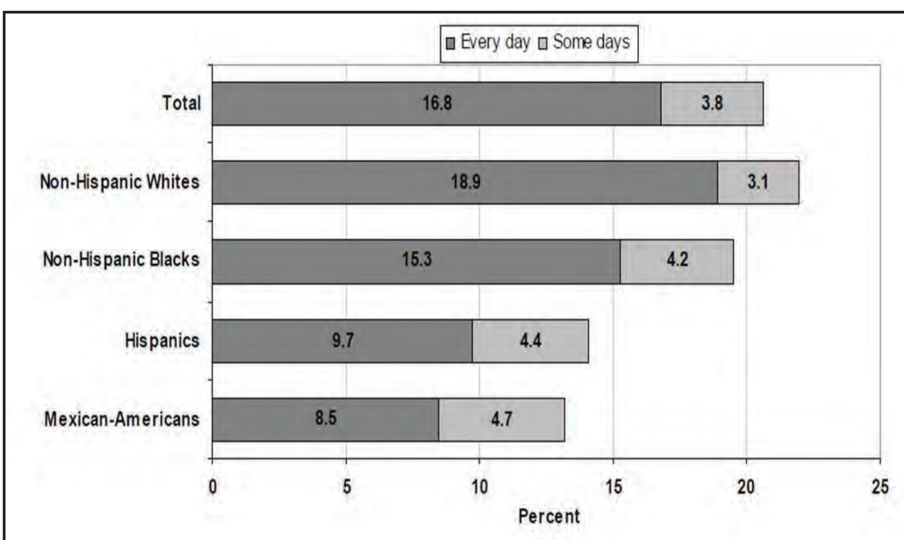

***Figure 5*: Cigarette smoking rates* among persons 18 years of age and over, by smoking status and race/ethnicity, United States 2004**

Source: Lethbridge-Ceiku, M., Rose, D., & Vickerie, J. Summary health statistics for U.S. adults: National Health Interview Survey, 2004. *Age-adjusted to the U.S. 2000 standard population

Smokers and other tobacco users usually begin using tobacco products during adolescence, developing an addiction that is difficult to break in adult life. In the 2005 Youth Risk Behavior Survey a large proportion of high school students reported current smoking (defined as having smoked at least one day in the 30 days preceding the survey) and current frequent smoking (defined as having smoked on 20 of 30 days before survey; CDC, 2006). The rates of current and current frequent smoking among high school students increased during the 1990s but declined in the early 2000s. In 2005, 23 percent of high school students were current smokers, and 9.4 percent were current frequent smokers.

The combined 2000-2003 NHIS provides some smoking information for the U.S.-Mexico border population (Albertorio, 2008). **Figure 6** presents age-adjusted rates of cigarette smoking by smoking status for the United States and border residents. For the years 2000-2003, the proportion of border residents who were current smokers was smaller than the national rate, 17.4 percent versus 22.4 percent. In the border region, the current smoking rate among Hispanics was lower than among non-Hispanics (15.5 percent versus 19.1 percent), although this difference is not statistically significant. The rate of every-day smoking was also much smaller for border Hispanics than for non-Hispanics.

While smoking rates are relatively low on the border, they are still higher than in the race/ethnicity group with the lowest smoking rate in the United States, Asian-Americans (11.2 percent). Current smoking rates expose a significant number of border residents to excess risk of heart disease and stroke. Continued efforts are needed to reduce the border smoking rate.

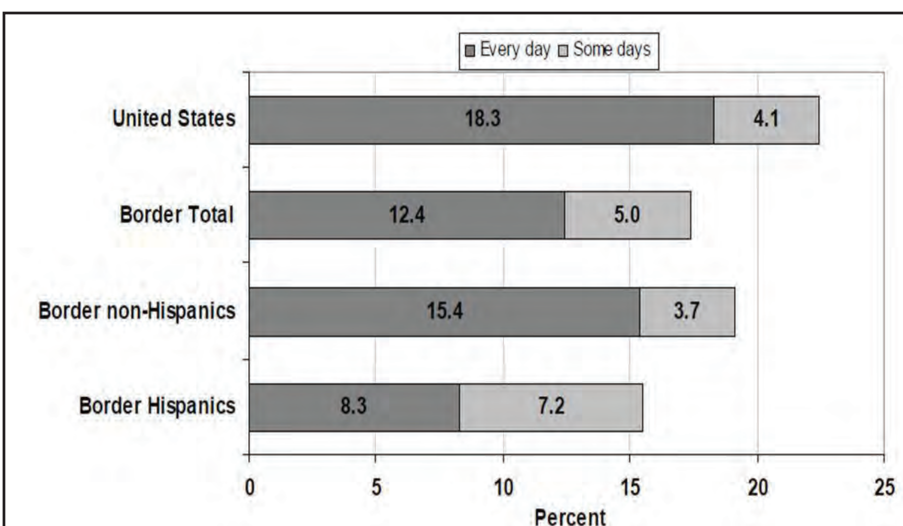

***Figure 6*: Cigarette smoking rates* among persons 18 years of age and over, by smoking status and race/ethnicity, United States and U.S.-Mexico border, 2000-2003**

Source: 2000-2003 National Health Interview Surveys, National Center for Health Statistics
*Age-adjusted to the U.S. 2000 standard population.

High blood cholesterol

Blood cholesterol level is directly related to the risk of coronary heart disease and also contributes to stroke risk (Cleeman, 1998; NINDS, 2004). The Framingham Heart Study documented the increasing risk of coronary heart disease with increases in cholesterol level (Kannel, 1979). Results from the Multiple Risk Factor Intervention Trial (MRFIT) suggest that coronary heart disease risk at 240 mg/dL is double that at 200 mg/dL and a cholesterol level of 240-300 mg/dL raises coronary heart disease risk to more than four times that at 200 mg/dL (NCEP, 1990).

These and other trials also demonstrated that total cholesterol is only part of the risk picture. Cardiovascular disease risk is also affected by the balance between the two types of cholesterol – high-density lipoproteins (HDL) and low-density lipoproteins (LDL) – and a third type of fat carried in the bloodstream, called triglycerides. HDL cholesterol is "good" cholesterol that helps prevent plaque from building up in arteries. An HDL level of 40 mg/dL or less is considered a major risk factor for heart disease. HDL levels of 60 mg/dL and above are desirable because they help to lower the risk of heart disease. LDL cholesterol is "bad" cholesterol that promotes plaque build-up on arterial walls. LDL levels of 160 mg/dL and above are considered high. Triglycerides are another lipoprotein found in the bloodstream. Triglycerides can also contribute to atherosclerosis, and levels of 200 mg/dL and above are considered high (NHLBI, 2005).

These results, combined with findings on the effectiveness of dietary intervention and drug treatment in controlling blood cholesterol levels, led to the establishment of the National Cholesterol Education Program (NCEP) in 1985 (Cleeman, 1998). The NCEP was implemented to increase professional and public cholesterol awareness, educate the public on the need for regular measurement of cholesterol, promote changes in diet to reduce fat intake, and encourage physical fitness and weight control. Guidelines developed by the NCEP recommend a total blood cholesterol level of 200 mg/dL or lower as the desirable level, with levels between 200-239 mg/dL considered borderline high and those above 240 mg/dL as high blood cholesterol. The NCEP and similar programs recommended that adults aged 20 years or more have their total and LDL cholesterol measured at least once every five years, that treatment with diet and/or drugs be initiated at lower cholesterol levels than previously used, and that men and women receive similar treatment.

As a result of these programs, major changes have been noted in physician and public awareness of the dangers of high cholesterol. Much remains to be done, however, to extend recommended treatment to all those who would benefit, particularly those with coronary heart disease. Based on the NCEP guidelines and blood cholesterol levels from the 1988-1991 NHANES survey, nearly 30 percent of U.S. adults require medically supervised cholesterol reduction. This percentage includes the 10 million-plus coronary heart disease patients in the United States (Sempos, 1993). In the late 1990s, only one-third to one-half of coronary heart disease patients were receiving dietary or pharmacological treatment for high cholesterol, while an estimated 85 percent of patients would have benefited from such treatment (Cleeman, 1998).

Between 1988 and 2002 the use of diet and medical interventions grew, in particular the use of drugs to lower cholesterol levels. From 1988-1994 to 1999-2002, the use of statins to reduce cholesterol in U.S. adults increased significantly, from 3.4 percent to 9.3 percent; among Mexican-Americans the use of statins rose from 2.4 to 6.0 percent (Carroll, 2005). The result has been continued declines in total and LDL cholesterol in U.S. men and women, particularly in men 60-74 years of age and women 50-74 years. Nevertheless, decreases in cholesterol levels were smaller than in previous decades, possibly because of the increased prevalence of obesity. Among Mexican-Americans, the only significant declines from 1988-94 to 1999-2002 occurred in total and LDL cholesterol for women (Carroll, 2005).

Age-adjusted cholesterol measures for the Hispanic population are similar to those for non-Hispanic whites, with the exception of triglycerides (**Table 2**). Average total cholesterol for Hispanics is slightly lower than in non-Hispanic whites, 202 mg/dL versus 204 mg/dL, but the difference is not statistically significant; the same is true for LDL cholesterol. The major difference is in the significantly higher level of triglycerides – 139 mg/dL for Hispanics, compared to 125 mg/dL for non-Hispanic whites and 94 mg/dL for non-Hispanic blacks. High levels of triglycerides appear to increase the risk of coronary heart disease, but more research is required before the connection is definitively established. Various reports published by the San Antonio Heart Study group have found roughly similar results for Mexican-Americans and non-Hispanic whites in an area near the U.S.-Mexico border (Hunt, 2003; Stern, 1999). No information is available on blood cholesterol levels for the population of the border region.

	Non-Hispanic whites	Non-Hispanic blacks	Hispanic
Total cholesterol	204	199	202
HDL	51.2	54.5	48.9
LDL	124	121	121
Triglycerides	125	94	139

***Table 2*: Age-adjusted blood cholesterol levels by race and ethnicity, United States adults aged 20 years or more, 1999-2002**

Source: Carroll, M.D., Lacher, D.A, Sorlie, P.D., Cleeman, J.I., Gordon, D.J., Wolz, M., et al. (2005). Trends in serum lipids and lipoproteins of adults, 1960-2002. Journal of the American Medical Association, 294, 1773-1781.

Overweight, obesity, and physical inactivity

The increasing level of overweight and obesity is a growing public health problem for border residents and for all U.S. residents. Overweight or obese individuals are at increased risk of illness from high blood pressure, high blood cholesterol and other lipid disorders, type 2 diabetes, heart disease, stroke, gallbladder disease, sleep apnea, and certain cancers (HHS, 2000). The total cost of obesity-related illness in the United States is about $100 billion per year (Wolf, 1998). Men in the highest obesity category have more than double the risk of hypertension or high blood cholesterol, or both, compared to males of normal weight. Women in the highest obesity group are four times as likely to develop either or both of these risk factors compared to women of normal weight (HHS, 2000).

Prevention or reversal of overweight remains a challenge for individuals, the medical community, and public health practitioners. Overweight and obesity have been increasing since the 1970s in the United States, based on actual measurement of heights and weights collected through various rounds of the NHANES survey (Flegal, 1998). Increasing overweight is occurring in adults, adolescents, and children of all ethnicities. Mexican-Americans are among the most vulnerable, as NHANES surveys since the 1980s show high levels of obesity in Mexican-Americans in all three groups. NHANES collects data on Mexican-Americans, not on all Hispanics in the United States.

Public health campaigns and physician advice to develop a healthy diet, reduce caloric intake and increase physical activity have had little impact on the increasing levels of overweight and obesity. Few drugs exist that can help to reduce weight, and most have side effects that discourage use. Surgical treatments exist such as stomach stapling or banding, but the relatively high level of complications for these procedures limit their use primarily to the morbidly obese.

Table 3 provides national data on obesity trends for non-Hispanic whites, non-Hispanic Blacks, and Mexican-Americans from the 1980s to 2004. The results show increasing levels of obesity for all groups, but also the higher prevalence of obesity among Mexican-American women as compared to white non-Hispanic women. Obesity data based on actual measurement of heights and weights do not exist for the border region, but self-reported data are available from the 2000-2003 NHIS (Albertorio, 2008). The NHIS reported an age-adjusted obesity prevalence for the border of 21.9. There was a large and statistically significant difference in the level of obesity between Hispanics and non-Hispanics, 28.7 percent versus 17.6 percent. In addition, the 2004 Texas Behavioral Risk Factor Surveillance System (BRFSS) included a supplementary sample for Cameron, Webb, and Starr Counties, all of which border Mexico (unpublished data). The survey was conducted by telephone, which has been shown to underestimate obesity. However, the survey still reported an alarmingly high overall prevalence of obesity of 32 percent, plus an additional 37 percent who were overweight. Comparable obesity rates from other BRFSS surveys were 26 percent for Texas and 23 percent nationally.

Public health and physician recommendations regarding increased physical activity also appear to have fallen on deaf ears. The proportion of Americans who engaged in no leisure-time activity rose from 24 percent in 1985 to 40 percent in 1997 (HHS, 2000). Hispanics were the race or ethnic group with the highest level of inactivity, at 54 percent. Data from the Youth Risk Behavior Surveillance System indicate that major declines in vigorous physical activity among adolescents take place during the high school years, setting the pattern for inactivity in the adult years (HHS, 2000).

Physical activity is important both to prevent overweight and obesity and for its independent effects on high blood pressure and other risk factors. Several studies of Mexican-Americans document higher levels of no leisure-time physical activity than among whites for both men and women (Wei, 1996; Winkleby, 1998). A national study reported that twice as many Mexican-American as white women engaged in no leisure-time physical activity, 44 percent versus 21 percent

(Winkleby, 1998). This study also demonstrated that the level of physical inactivity among Mexican-American women remained higher than among white women regardless of the level of education. The 2000-2003 NHIS data showed that 43.2 percent (age-adjusted) of the entire border population had no leisure-time physical activity (Albertorio, 2008). More than half (54 percent) of all Hispanics and 36 percent of non-Hispanics reported no leisure-time activity.

	Non-Hispanic Whites		Non-Hispanic Blacks		Mexican-Americans*	
	Male	Female	Male	Female	Male	Female
1976-80 or 1982-94*	12.0	14.8	15.0	30.0	15.4	25.4
1988-94	20.0	22.4	21.3	37.4	23.1	34.2
2003-04**	31.1	30.2	34.0	53.9	31.6	42.3

***Table 3*: Age-adjusted prevalence of obesity by race and ethnicity for men and women aged 20-74 years, United States**

Sources: Flegal, K.M., Carroll, M.D., Kuczmarski, R.J., & Johnson, C.L. (1998). Overweight and obesity in the United States: Prevalence and trends, 1960-1994. International Journal of Obesity, 22, 39-47. Ogden, C.L., Carroll, M.D., Curtin, L.R., McDowell, M.S., Tabak, C.J., Flegal, K.M. Prevalence of overweight and obesity in the United States, 1999-2004. (2006). Journal of the American Medical Association. 295. 1549-1555. * Non-Hispanic White and non-Hispanic Black data are from NHANES II, 1976-80; Hispanic data are from Hispanic NHANES, 1982-84. ** Data for 2003-04 are for men and women aged 20 years or more.

Diabetes

Diabetes has been closely associated with both risk factors for cardiovascular disease and cardiovascular disease itself. Common complications of diabetes include overweight, hypertension, and coronary heart disease. People with diabetes are also more likely to have a poor lipid profile, including high total cholesterol levels, low levels of HDL, and high levels of LDL and triglycerides. According to the National Diabetes Data Group (National Institutes of Health, 1995), the most common cause of death in adults with diabetes is coronary heart disease. In people with diabetes, heart disease appears earlier in life and is more often fatal than in people without diabetes. Women with diabetes are affected by heart disease almost as often as men. Adults with diabetes have heart disease death rates two to four times higher than adults without diabetes; the risk for stroke is two to four times higher and the risk of death from stroke is 2.8 times higher among people with diabetes (American Diabetes Association, 2006).

Two cohort studies of Hispanics and non-Hispanic whites have looked at the association between diabetes and heart disease: the San Luis Valley Study and the San Antonio Heart Study (Stern, 1999; Swenson, 2002). Curiously, these two well-executed longitudinal studies came to opposite conclusions regarding the risk of heart disease among Hispanics with diabetes. The San Antonio Heart Study determined that the risk of cardiovascular disease was twice as great for Mexican-American diabetics as for non-Hispanic white diabetics. The San Luis Valley Diabetes Study found that male Hispanics with diabetes had a statistically significant decreased risk of cardiovascular disease. The San Antonio study had a much larger sample size and was able to obtain statistically significant differences for most study comparisons, but on the other hand relied on death certificate data to determine cause of death. The San Luis Valley study had a smaller sample size and so was able to show statistical significance for fewer of its findings, but used medical records of decedents to assign cause of death, a potentially more accurate source of information on the cause of death. The opposing conclusions of these two studies may be due to the different outcome measures used: The San Antonio study used any mention of cardiovascular disease, whether the underlying cause of death or not, as the outcome of interest; in the San Luis Valley study the outcome of interest was cardiovascular disease as the underlying cause of death.

Proper management of diabetes can help to reduce the risk of cardiovascular disease. By maintaining blood glucose (sugar) levels as close to normal as possible, people with diabetes may be able to lessen their risk of cardiovascular disease. The Diabetes Control and Complications Trial (1993) found that improved control of blood glucose levels in young adults with insulin-dependent diabetes mellitus may have reduced their excess risk of heart disease. Controlling blood pressure can reduce the incidence of cardiovascular disease by one-third or more, and improving control of cholesterol or blood lipoproteins (HDL, LDL, triglycerides) can reduce cardiovascular complications by 20 percent or more (American Diabetes Association, 2006).

Detailed information on diabetes mortality, morbidity, and risk factors in the border region is provided in Chapter 7, "Diabetes."

Conclusion

Heart disease and stroke have a major impact on health in the border region, causing disease, disability, and death. Mortality data suggest that Hispanics have much lower death rates due to heart disease and stroke than do non-Hispanic whites. This observed difference, in combination with higher levels of certain risk factors for Hispanics, gave rise to the theory of the "Hispanic paradox." However, careful examination of longitudinal cohort studies raises questions about the Hispanic advantage in heart disease and stroke.

Over the last several decades, heart disease and stroke death rates have fallen, both in the United States and in the border area. However, heart disease and stroke remain the first and third leading causes of death for border residents. Cardiovascular disease death rates also rise sharply with age and are particularly high after age 65. As the elderly population in the border region grows, both because current residents are aging in place and because retirees are relocating to the area, the impact of heart disease and stroke on the region can be expected to increase. Hospital discharge rates for diagnoses associated with cardiovascular disease are generally lower on the border than in the rest of the United States.

A large percentage of the border population displays risk factors for cardiovascular disease, including high levels of obesity and physical inactivity, a high rate of diagnosed diabetes, and problems with blood pressure awareness and control. Compared to the U.S. population, border residents have advantages in terms of some risk factors, including lower rates of hypertension and of cigarette smoking.

This review of heart disease and stroke in the U.S.-Mexico border region suggests that public health efforts should continue to emphasize the Healthy Border and Healthy Gente 2010 program objectives targeting diabetes, obesity, and smoking, all of which contribute to cardiovascular disease. An additional recommendation, based on the findings of this review, is that hypertension screening and control be added to the list of Healthy Border 2010 objectives. Public and private health services should continue to promote health education regarding risk factors for cardiovascular disease and their control. Because of the lifestyle factors implicit in the development of many of these risk factors, schools should be enlisted to ensure that the health education and health promotion messages reach border youth as well as adults.

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CHAPTER 9

INJURIES

Injury is a major cause of death in the United States as well as in the U.S.-Mexico border region. About two-thirds of all injury deaths are due to accidents or unintentional injuries. The remaining third are the result of intentional injuries, including suicides and homicides, and deaths with intent undetermined. Unintentional injuries alone were the fifth leading cause of death nationally and the fourth leading cause of death for the border in 2004.

This chapter reviews the various causes of unintentional and intentional injury deaths in the border region, with comparisons to the United States and other areas where appropriate. Information on injury deaths used in this chapter is from the National Vital Statistics Data System of the National Center for Health Statistics. Data for the border region are based on deaths occurring in the United States to residents of the 44 border counties. The analysis also considers injury death rates for various components of the border population, including men and women as well as Hispanics and non-Hispanic whites. Particular attention is paid to the younger ages, as many injury deaths are concentrated below age 45, and for some causes below age 25 years. Deaths among the young have the greatest impact on life expectancy and are viewed by many as representing the greatest loss to society.

To develop effective injury prevention programs, policy makers and public health leaders need information about who is dying from injuries, where they are dying, and how they are dying. To that end, this chapter focuses on the causes of injury deaths in the border region.

Understanding Injury

Injury results from the transfer of one or more types of physical energy (mechanical, thermal, etc.) in amounts or at rates that exceed human tolerance

(Baker, 1992). Injury may also result from the lack of an essential substance, such as oxygen deprivation. Injury deaths may be intentional, such as homicide or suicide, unintentional, or of undetermined intent. Unintentional injuries may result from a variety of mechanisms, including motor vehicle crashes, fires, poisoning and falls. Although unintentional injuries are often referred to as accidents, in most cases the results are not accidental in the sense of being random, unpreventable events. Considerable evidence exists that most injuries can be predicted and therefore are preventable (Pless, 2005).

Economic costs of injury include not only the direct costs of medical care and rehabilitation, but also the loss of income to the individual and loss of productivity to society. Unintentional injuries alone cost the nation an estimated $565 billion in 2004, equivalent to $2,000 per capita or about $5,100 per household (National Safety Council [NSC], 2007). These costs far outweigh the costs of prevention. For example, it is estimated that each child auto safety seat saves an amount equal to its cost in direct medical costs and 15 times as much in indirect costs. Likewise, every bicycle helmet is estimated to save eight times its cost in direct medical and other costs (NSC, 1995).

Injuries and Healthy Border 2010

In recognition of the importance of injuries to the overall health of border residents, Healthy Border includes three injury objectives among the program total of 21 objectives on the U.S. side. The injury objectives and their 2010 targets focus on childhood injuries, injuries due to motor vehicle crashes, and suicides. Specifically, the objectives are: (a) reduce the death rate due to unintentional injuries by 30 percent for children zero to four years of age; (b) reduce the death rate due to motor vehicle crashes by 25 percent; and (c) reduce the death rate due to suicide by 15 percent (U.S.-Mexico Border Health Commission, 2003).

Injury Deaths by Intent

Injuries accounted for more than 3,400 deaths on the U.S.-Mexico border in 2004, or about 7.5 percent of all border deaths. **Table 1** shows injury deaths by intent in the border region. Nationally, injuries were somewhat less likely to be a cause of death, accounting for seven percent of all deaths. Both in the border region and nationally, about two-thirds of injury-related deaths in 2004 were due to unintentional injuries, while one-third were due to intentional causes. In 2004 more than 2,300 border residents died from unintentional injuries.

	All Injuries			Unintentional Injuries		Intentional Injuries	
Area	Number	Rate	Percent of all deaths	Number	Rate	Number	Rate
United States	167184	56.4	7.0	112012	37.7	50196	17.0
Border states	35230	54.8	7.9	22926	36.1	11635	17.5
Arizona	4388	77.2	10.0	2853	50.1	1411	22.5
California	16786	47.6	7.2	10530	30.1	5929	16.3
New Mexico	1790	95.4	12.8	1254	67.1	535	28.0
Texas	12266	57.6	8.0	8289	39.6	3760	16.8
Border counties	**3423**	**50.3**	**7.5**	**2306**	**33.8**	**1059**	**15.7**
Arizona border	933	73.2	8.9	618	47.8	291	23.4
California border	1474	47.8	7.1	972	31.5	479	15.6
New Mexico border	227	72.5	9.8	150	47.5	77	25.0
Texas border	789	36.8	6.7	566	26.2	212	10.1

***Table 1*: Injury deaths by intent, U.S.-Mexico border counties, 2004**

Source: National mortality data, NCHS/CDC
Note: Rates are per 100,000 population, age-adjusted to the U.S. 2000 standard population

Unintentional injury deaths represented about five percent of all deaths in the border region and were the fourth leading cause of death. When ranked according to a measure known as the years of potential life lost (YPLL), unintentional injuries were the second leading cause of death. The YPLL measure assumes a potential life span of 75 years and adds up the years of life lost by those dying before age 75. In addition, unintentional injuries were the leading cause of death for residents less than 45 years of age, accounting for more than one-quarter of all deaths for this age group. The same age pattern held for both Hispanics and non-Hispanic whites in the border region. Together, unintentional and intentional injury deaths accounted for 40 percent of deaths among border residents less than 45 years of age, far higher than the proportion due to cancer (12 percent), the most common natural cause of death in this age group.

Within the border region, injuries accounted for a larger proportion of deaths in Arizona and New Mexico border counties compared to the border counties of California and Texas. In Arizona and New Mexico border counties, death rates per 100,000 population were almost exactly double the Texas border counties' death rate for all types of injuries, 73.2 and 72.5 versus 36.8. This disparity was roughly the same for both unintentional and intentional injury deaths. Disparities were slightly smaller but still substantial for the four border states.

Both nationally and at the border, injury death rates in 2004 were much lower for women than for men, and for Hispanics as compared to Non-Hispanic whites, as shown in **Table 2**. The unintentional injury death rate for men was more than twice that for women (46.9 vs. 21.2), while for intentional injury deaths the male rate was nearly four times the rate for women (25.2 vs. 6.8). In the border region, large differentials also existed by ethnicity, with substantially higher death rates among non-Hispanic whites than for Hispanics, for both unintentional injuries (40.7 vs. 26.9) and intentional injuries (19.4 vs. 10.2). When these sex and ethnicity groups were combined, even larger differentials were seen, as depicted in **Figure 1**. For example, the intentional injury death rate for border Hispanic men was more than twice the level for Hispanic women, and the same male-female differential was true for non-Hispanic whites. Throughout the border region, injury death rates were substantially higher for non-Hispanic whites than for Hispanics for both types of injury deaths and for both sexes.

	Unintentional		Intentional	
	Rate	95% C.I.	Rate	95% C.I.
Male	46.9	(44.6, 49.3)	26.1	(24.3, 27.8)
Female	21.2	(19.7, 22.8)	7.7	(6.7, 8.6)
Hispanic	26.9	(24.7, 29.2)	10.8	(8.3, 13.4)
White non-Hispanic	40.7	(36.9, 44.5)	20.6	(16.7, 24.4)

***Table 2*: Unintentional and intentional injury death rates by sex and ethnicity, U.S.-Mexico border counties, 2004**

Source: National mortality data, NCHS/CDC
Note: Rates are per 100,000 population, age-adjusted to the U.S. 2000 standard population
*C.I. = 95% confidence interval

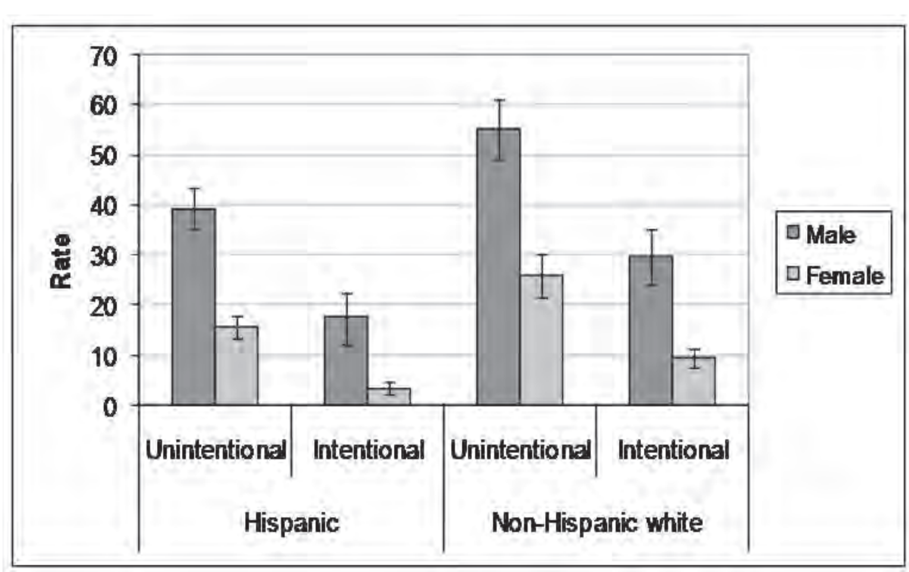

***Figure 1*: Unintentional and intentional injury death rates by sex and ethnicity, U.S.-Mexico border counties, 2004**

Source: National mortality data, NCHS/CDC
Rates are per 100,000 population, age-adjusted to the U.S. 2000 standard population.

Unintentional Injury Deaths by Cause

Unintentional injury deaths result from a variety of causes, including motor vehicle crashes, firearms, drowning, falls, poisoning, and other mechanisms. Understanding the causes of injuries is an essential step toward devising effective injury prevention programs. Prevention of unintentional injuries requires addressing a group of complex problems involving different sectors of society, including health, education, transportation, law, engineering and others. Because many of these activities are aimed at modifying human behavior, they must be culturally and linguistically appropriate.

Table 3 provides data on the leading causes of injury death for all ages combined and for those below age 45. Little difference was observed between the United States and the border region in the ranking of causes of unintentional injury death by age. In both areas, motor vehicle crashes were the most common cause of unintentional injury death, accounting for nearly half of these deaths, followed by unintentional poisonings and falls. In the following sections, each leading cause of unintentional injury death shown in Table 3 is considered in turn.

	United States		Border	
Cause	All ages	0-44 years	All ages	0-44 years
Total number	112,012	50,311	2,306	1,060
		Percent distribution		
Motor vehicle crash	40.1	53.9	42.1	56.5
Poisoning	18.7	24.7	22.7	26.4
Falls	16.8	2.6	15.0	1.1
Drowning	3.0	4.3	4.0	4.3

Source: National mortality data, NCHS/CDC

Table 3**: Leading causes of unintentional injury deaths, United States and U.S. Mexico border counties, 2004**

In most mortality reports, unintentional injury deaths are grouped into one category and ranked in comparison to other causes of death. As a result, the category of unintentional injury deaths due to all causes is usually ranked as the fourth leading cause of death, as was mentioned above. One of the goals of this analysis was to show the importance of each of the various causes of unintentional injury death. Thus, each major cause of injury death is ranked separately, in comparison to all other causes of death.

Motor Vehicle Crashes

The causes of motor vehicle crashes are well known, and national road safety campaigns have succeeded in substantially reducing motor vehicle crash deaths in recent decades. Nonetheless, motor vehicle crashes remain the largest single cause of unintentional injury deaths, accounting for 40 percent of these deaths nationwide in 2004. Motor vehicle crashes are also a major source of injury and an important cause of property damage. Economically, motor vehicle crash deaths, injuries, and property damage impose a major burden on the nation.

Motor vehicle crashes are the result of a number of factors, some of which arise from inadequate government infrastructure and insufficient enforcement of driving regulations. Increased traffic volume, the result of a growing number of vehicles and passenger miles driven annually, poses one of the biggest challenges to reducing motor vehicle crash deaths. Local, state, and national governments have difficulty providing sufficient and safe roadways to accommodate growing vehicular traffic. Driver behavior also causes many crashes. High-risk behaviors include lack of compliance with driving regulations, use of alcohol or illegal drugs that impair drivers' performance, and failure to use passenger restraints. Government enforcement of driving regulations is an effective way to address these behaviors, but funding for enforcement efforts is often limited.

In 2004, injury resulting from motor vehicle crashes was the eighth leading cause of death, both nationally and for the border region. **Table 4** shows motor vehicle crash deaths, death rates, and ranking in the border region. The death

		Both Sexes				Males		Females	
				Ranking					
	Average Annual Number	Rate	CI*	All Causes	Unintentional Injury	Rate	CI*	Rate	CI*
USA	44,933	15.2	(15.0, 15.3)	8	1	21.4	(21.2, 21.7)	9.3	(9.1, 9.4)
Arizona	1,156	20.1	(19.0, 21.3)	8	1	27.1	(25.2, 29.0)	13.3	(11.5, 15.2)
California	4,319	12.1	(11.8, 12.5)	8	1	16.9	(16.3, 17.5)	7.5	(6.9, 8.0)
New Mexico	533	27.9	(25.5, 30.3)	6	1	38.6	(34.5, 42.6)	17.6	(14.3, 20.8)
Texas	3,816	17.2	(16.7, 17.8)	6	1	24.5	(23.5, 25.4)	10.4	(9.7, 11.2)
Border counties	**971**	**14.0**	**(13.1, 14.9)**	**8**	**1**	**19.7**	**(18.2, 21.2)**	**8.5**	**(7.5, 9.4)**
Arizona border	230	18.0	(15.7, 20.4)	8	1	22.5	(18.7, 26.3)	13.8	(10.9, 16.6)
California border	371	12.0	(10.8, 13.2)	8	1	17.6	(15.5, 19.7)	6.3	(5.1, 7.6)
New Mexico border	64	19.8	(14.8, 24.7)	6	1	26.5	(18.3, 34.8)	13.3	(7.7, 18.8)
Texas border	306	13.5	(11.9, 15.0)	6	1	19.9	(17.2, 22.6)	7.5	(5.9, 9.0)
Border counties:									
- Hispanics	469	13.8	(12.5, 15.1)	5	1	19.9	(17.6, 22.1)	8.1	(6.7, 9.5)
- non-Hispanic white	412	14.3	(12.9, 15.7)	9	1	19.6	(17.3, 21.9)	8.9	(7.3, 10.5)

***Table 4*: Motor vehicle crash deaths, death rates, and ranking, 2004**

Source: National mortality data, NCHS/CDC
Notes: Rates are per 100,000 population, age-adjusted to the US 2000 standard population; CI* = 95% confidence interval

rate from motor vehicle crashes exceeded the national rate of 15.2 per 100,000 population in three of the four border states and in the border regions of two of those states. The highest death rates were reported in the state and border area of New Mexico. The New Mexico motor vehicle crash death rate was 27.9, about 80 percent higher than the national rate; the New Mexico border rate was 19.8, or 30 percent above the national figure, although this difference was not statistically significant. In Arizona, the statewide death rate was 20.1 and the rate for Arizona border counties was 18.0, both substantially above the national rate. The death rate for the entire border area (14.0) was eight percent lower than the national rate, largely due to the low death rates in the border regions of California (12.0) and Texas (13.5). The death rate for border Hispanics was slightly lower than the border non-Hispanic white rate (13.8 versus 14.3), but the difference was not statistically significant. However, among border Hispanics, motor vehicle crashes were the fifth leading cause of death, while among non-Hispanic whites they were the ninth leading cause of death. The death rate for men was consistently higher than for women, nationally and across the border region.

Although the motor vehicle crash death rate declined substantially from 1990 to 2000 for both the United States and for border counties, it did not change significantly between 2000 and 2004. **Figure 2** shows these trends. Across the four border states, the motor vehicle crash death rate rose from 2000 to 2004 in

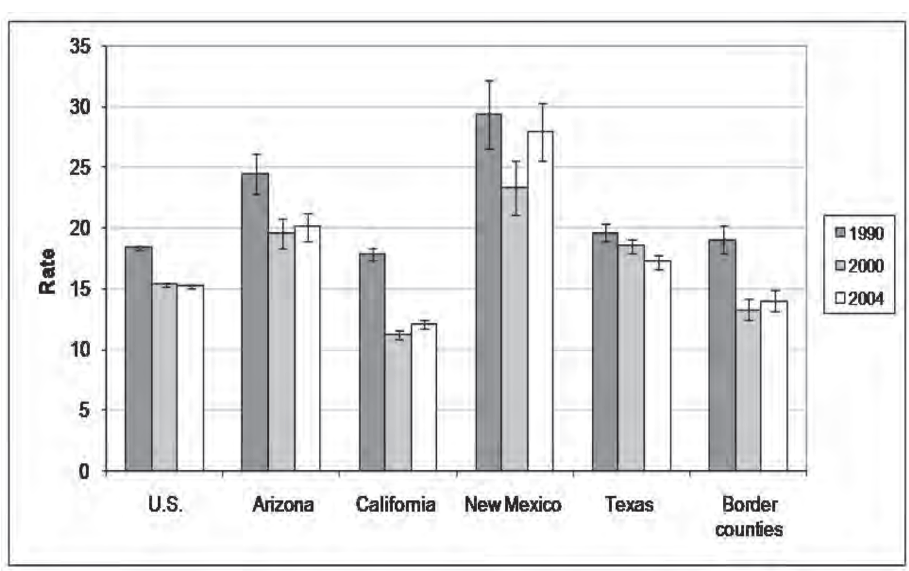

Figure 2**: Motor vehicle crash death rates, United States, border states, and border counties, 1994, 2000, and 2004**

Source: National mortality data, NCHS/CDC
Rates are per 100,000 population, age-adjusted to the U.S. standard 2000 population.

California and New Mexico but declined in Texas. The increase in Arizona from 2000 to 2004 was not statistically significant.

Motor vehicle crash death rates were also available for individual border counties. Because the number of these deaths was quite small for many border counties, the counties were grouped into clusters and five years of data were combined to produce more stable and statistically reliable rates. **Figure 3** provides a border map depicting death rates in 2000-2004 for 13 clusters of counties along the U.S.-Mexico border. The lowest rates, ranging from 10.5 to 14.8 deaths per 100,000 population, were found in four areas: San Diego County, California; two South Texas county clusters that include Laredo and Brownsville; and El Paso and neighboring counties in West Texas. The highest rates (ranging from 23.9 to 50 per 100,000) were in Cochise County, Arizona; western border counties of New Mexico; and a group of sparsely populated counties in West Texas. This last cluster had by far the highest death rate from motor vehicle crashes, 50.5 (CI=40.2, 60.7). These rates were based on deaths to border county residents; rates based on death by place of occurrence would provide slightly different results.

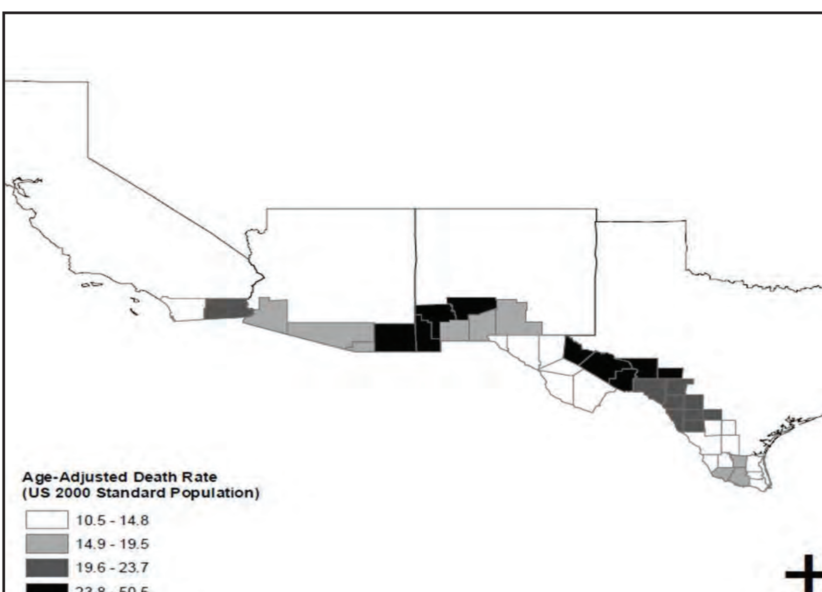

***Figure 3*: Motor vehicle crash rates by county clusters, U.S.-Mexico border, 2000-2004**

Source: National mortality data, NCHS/CDC

Motor vehicle crashes have their greatest impact on the young. As **Table 5** shows, motor vehicle crashes are the leading cause of death for ages 1-4, 5-14, 15-24 and 25-34 years, both nationally and for border counties. Motor vehicle crashes

	United States		Border All Ethnicities		Border Hispanic		Border non-Hispanic White	
Age	Percent	Ranking	Percent	Ranking	Percent	Ranking	Percent	Ranking
1-4	13.3	1	17.6	1	20.0	1	17.6	1
5-14	24.2	1	26.5	1	27.2	1	23.2	1
15-24	32.9	1	36.9	1	40.6	1	35.3	1
25-34	17.2	1	16.0	1	14.9	1	17.2	1
35-44	7.8	3	8.2	4	10.3	3	6.7	5

Source: National mortality data, NCHS/CDC

***Table 5*: Motor vehicle deaths by age and ethnicity: proportion of all deaths and ranking, United States and U.S.-Mexico border counties, 2004**

accounted for 20 percent or more of deaths for the age groups 5-14 and 15-24 years. Among border Hispanics, motor vehicle crashes were even more important, representing more than 40 percent of all deaths in the 15-24 year age group.

The disproportionate impact of motor vehicle crashes on the young adds to the overall burden of this cause of death. The true impact of motor vehicle deaths is best illustrated using the YPLL measure. When the YPLL is used to rank causes of death, motor vehicle crashes are the third leading cause of death on the border. **Figure 4** shows leading causes of death in border counties calculated using YPLL. Motor vehicle crashes are also the third leading cause of death among border Hispanics, based on the YPLL measure (data not shown).

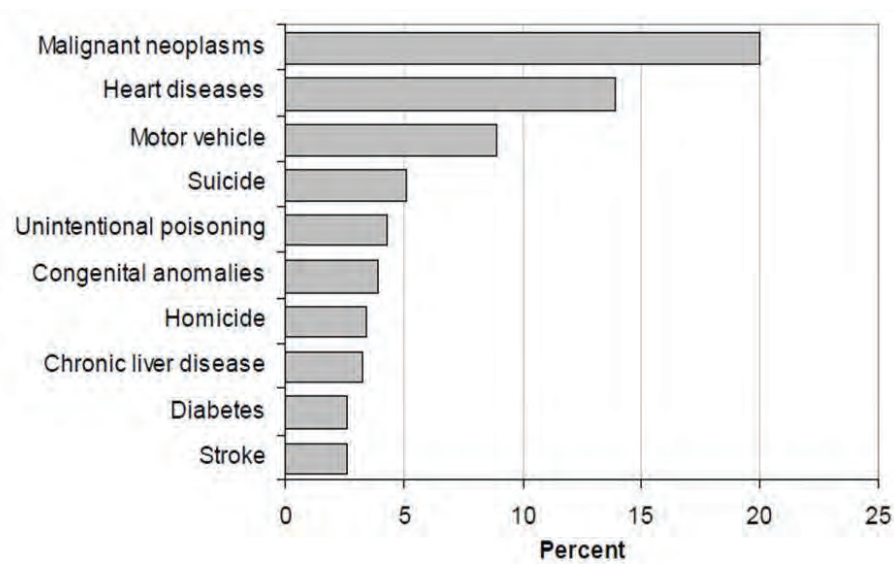

***Figure 4*: Leading causes of death based on years of potential life lost (YPLL), U.S.-Mexico border counties, 2004**

Source: National mortality data, NCHS/CDC

Motor vehicle crash deaths also have a great impact on the elderly, as shown in **Figure 5.** In 2004, death rates were very high not only for teens and young adults 15-24 years of age, but also for the elderly, especially the population aged 75 years or more. The pedestrian death rate, which is a component of the total motor vehicle crash death rate, was very low among the young but rose sharply after 64 years of age. Increased longevity, combined with an influx of retirees to the border states, is leading to significant growth in the elderly population of the border region. As a result, border traffic enforcement agencies are faced with the double challenge of ensuring the safety of two high-risk groups: the very young and the very old.

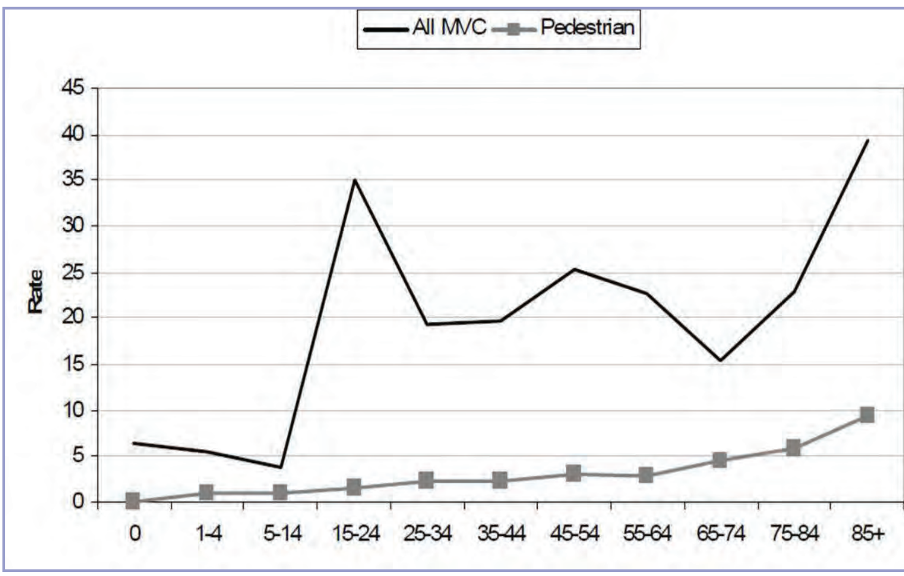

***Figure 5*: Rates for motor vehicle crash deaths and pedestrian deaths by age, U.S.-Mexico border counties, 2004**

Source: National mortality data, NCHS/CDC
Note: Rates are per 100,000 population, age-adjusted to the U.S. 2000 standard population.
*MVC = Motor vehicle crash

Risk Factors

A variety of factors, including behaviors, contribute to the risk of injury or death from motor vehicle crashes. Viewing motor vehicle crashes as a public health problem, however, makes it clear that many of these factors can be eliminated or mitigated through interventions (Bolen, 1997). The various risk factors and associated interventions are considered in turn.

Volume of traffic

As discussed in Chapter 1, "The U.S. Population at the Border," the population of border counties and states is growing quickly. Rapid population growth in the border counties will clearly lead to a steady increase in vehicle miles driven. In addition, drivers in the border region are not limited to border residents. The population growth in non-border areas of border states will also add to the traffic load, as will drivers from other parts of the nation. Other contributing factors include population growth in the border areas of Mexico and the growth in cross-border traffic. **Table 6** shows the number of incoming vehicle crossings for the U.S.-Mexico border during the years 1996, 2000, and 2003. The combined total of incoming trucks, buses and personal vehicles for the major ports of entry on the U.S.-Mexico border grew by more than 45 percent from 1996 to 2000, although the number declined slightly in 2003. Nevertheless, more than 92 million vehicles entered the U.S. border region from Mexico in 2003, an average of more than 250,000 incoming vehicles per day.

	1996	2000	2003
		Numbers in thousands	
Personal vehicles	**62,429**	**91,157**	**88,069**
Arizona	8,407	10,304	9,913
California	11,116	30,018	32,675
New Mexico	468	467	650
Texas	42,438	50,368	44,831
Trucks	**3,254**	**4,525**	**4,238**
Arizona	324	344	313
California	755	1,032	1,020
New Mexico	21	36	33
Texas	2,154	3,113	2,872
Buses	**120**	**270**	**319**
Arizona	4	14	13
California	23	151	186
New Mexico	-	-	1
Texas	93	105	119
All vehicles	**65,803**	**95,952**	**92,626**
Arizona	8,735	10,662	10,239
California	11,894	31,201	33,881
New Mexico	489	503	684
Texas	44,685	53,586	47,822

Source: U.S-.Mexico Border Crossing Data, Bureau of Transportation Statistics, U.S. Department of Transportation. Based on data from U.S. Customs Service, Mission Support Services, Office of Field Operations, Operations management Database.

***Table 6*: Incoming vehicle crossings, U.S.-Mexico border 1996, 2000, and 2003**

A useful measure of road traffic volume is the number of vehicle miles driven per year. The number of miles per vehicle has always been high in the border region due to urban sprawl and long distances between cities. The Federal Highway Administration (2000) estimates that the number of vehicle miles traveled in the four U.S. border states was nearly 500 million in 1990, a figure that rose to about 600 million miles in 2000. Projecting this trend forward produces an estimate of 900 million miles in 2020, or almost double the 1990 figure. The Federal Highway Administration also provides estimates of vehicle miles for the largest border counties. In these counties, vehicle miles increased by about three percent per year from 1995 to 2002. Assuming this rate of growth continues into the future, vehicle miles traveled in border counties will double by 2025.

Road traffic speed

Speed is a crucial factor in determining the likelihood of a motor vehicle crash, as well as the probability of injury or death. The higher the speed, the less time the driver has to react; high speed also greatly increases the chance of injury. As a rule of thumb, the probability of injury in a motor vehicle crash is proportional to the square of the speed, serious injury is proportional to the speed cubed, and fatal injury is proportional to speed to the fourth power (Andersson, 1997). In 2005, the National Highway Transportation Safety Administration (NHTSA) estimated that about 30 percent of fatal crashes in the United States were speed-related. For the border states this proportion was higher, ranging from about 34 percent in California and New Mexico to about 40 percent in Arizona and Texas (NHTSA, 2006).

Speed is most important as a road safety factor among young drivers and highway drivers. Among young drivers, lack of experience and thrill-seeking behavior often lead to excessive speed and motor vehicle crashes that otherwise would be avoidable. Maximum speeds on highways have increased in recent years, adding to the risk of a crash, injury, and death for highway drivers. For both groups, enforcement of road safety rules is essential, although it is only part of the solution. Improvements in road design such as divided highways with restricted access, removal of roadside hazards, and appropriate lighting can also significantly reduce the risk of speed-related motor vehicle crashes (Peden, 2004).

Alcohol use

Alcohol consumption increases the likelihood of a motor vehicle crash and injury or death. A review of different blood alcohol limits in 16 states found that states with lower limits had seven percent fewer alcohol-related crashes (Shults, 2001). Nationally, the estimated proportion of alcohol involvement (blood alcohol content >=80 mg/dL) in motor vehicle crash deaths was 34 percent in 2004 (NHTSA, 2005). In Arizona and California, alcohol was involved in 33 percent of motor vehicle crash deaths, a proportion similar to the national percentage. However, the proportion with alcohol involvement exceeded the national figure in the other two border states — particularly in Texas, where nearly 40 percent of fatalities occurred in alcohol-related crashes. Enforcement of blood alcohol limits is critical to reducing alcohol-related motor vehicle crash deaths, along with publicizing this enforcement and providing driver education via publicity campaigns.

Road design and rural roads

Road design is a key factor in determining the probability of motor vehicle crashes. The odds of road traffic crashes are raised by poorly designed roads that have blind intersections, inadequate lighting, poor signage, roadside hazards and other problems. Many rural roads include one or more of these design flaws. In addition, lower levels of traffic safety enforcement on these roads are exploited by many drivers, leading to excessive driver speed and/or alcohol use. Data from the state highway departments of the four border states indicated that a surprisingly high proportion of traffic fatalities occurred in rural areas, ranging from about 50 percent in California to about 60 percent in Arizona and Texas and nearly 75 percent in New Mexico (Arizona Department of Transportation, 2001; California Highway Patrol, 2001; New Mexico Highway and Transportation Safety Department, 2001; Texas Department of Public Safety, 2001).

Passenger restraints

Seat belts and child restraints can play a major part in preventing serious injury or death from motor vehicle crashes. Seat belts, especially in conjunction with airbags, can substantially enhance motor vehicle occupant safety. For drivers and front seat passengers, seat belts can reduce the risk of injury, serious injury, and death by 40 to 65 percent (Cummings, 2002). Child restraints reduce injury and fatalities in vehicle crashes by a similar amount (Traffic Safety Facts, 2002). Seatbelt and child restraint laws have greatly increased driver and passenger compliance, but usage varies greatly by state. On the basis of NHTSA data, seat belt use at the national level rose to 81 percent in 2006, up from 71 percent in 2000 (NHTSA, 2007). Seat belt use was above the national level in three of the four border states (90 percent in New Mexico and Texas; 93 percent in California) and below the national level in Arizona (79 percent). Seat belt use was far lower in fatal crashes: In 2005, more than half (52 percent) of all motor vehicle occupants killed in motor vehicle crashes were not using a seat belt or restraint (NHTSA, 2006). The proportion of fatal motor vehicle crashes in which seat belts were not used was similar in three of the four border states (Arizona, 54 percent; New Mexico, 50 percent; Texas, 47 percent), while in California a much lower percentage of those killed were not using seat belts (34 percent).

Unintentional Poisoning

Poisoning is the second leading cause of unintentional injury death in both the United States and the U.S.-Mexico border region. Most poisoning deaths are due to drugs, as opposed to alcohol or other poisonous substances, and most of these are caused by abuse of prescription drugs, especially opioids, and various illegal drugs (Paulozzi, 2006). An increase in unintentional poisoning deaths in recent years has been reported for the United States (CDC, 2007; Paulozzi, 2006) and for New Mexico (CDC, 2005).

This section uses information on the underlying cause of death from the national vital statistics system to examine levels and recent trends in unintentional poisoning deaths in the U.S. border counties nearest to Mexico, the four border states, and the United States. In addition, this analysis also uses multiple cause of death data to determine the types of drugs used by decedents, including multiple drug use.

Between 2000 and 2004, unintentional poisoning deaths increased substantially along the U.S.-Mexico border, as **Table 7** shows. The poisoning death rate increased in all four states during the four-year interval, although the change was not statistically significant for New Mexico. For the 44 border counties, the unintentional poisoning death rate also rose significantly during the same interval, from 6.4 to 8.0 deaths per 100,000 population. Poisoning death rates rose in the border counties of Arizona, California, and New Mexico during the four years, but the change was statistically significant only in California (from 5.7 to 8.4). In the border counties of Texas the poisoning death rate was unchanged during the interval.

	2000		2004	
	Rate	CI*	Rate	CI*
United States	4.5	(4.4, 4.6)	7.1	(7.0, 7.2)
Arizona	8.6	(7.8, 9.4)	10.7	(9.9, 11.6)
California	4.8	(4.5, 5.0)	7.2	(6.9, 7.4)
New Mexico	13.1	(11.4, 14.8)	15.3	(13.5, 17.1)
Texas	4.0	(3.7, 4.2)	6.6	(6.2, 6.9)
Border counties	**6.4**	**(5.8, 7.1)**	**8.0**	**(7.3, 8.7)**
Arizona border	13.2	(11.1, 15.4)	14.0	(11.8, 16.2)
California border	5.7	(4.8, 6.5)	8.4	(7.4, 9.4)
New Mexico border	8.2	(4.9, 11.6)	11.6	(7.7, 15.5)
Texas border	3.3	(2.5, 4.1)	3.3	(2.5, 4.1)

Notes: Rates are per 100,000 population, age-adjusted to the U.S. 2000 standard population
*CI = 95% confidence interval
Source: National mortality data, NCHS/CDC

***Table 7*: Unintentional poisoning death rates, United States and U.S.-Mexico border, 2000 and 2004**

There were also large differences in the poisoning death rate across the border region in 2004. At the state level, New Mexico had the highest rate (15.3), while Texas and California had far lower rates (6.6 and 7.2, respectively). In the border counties, the highest rates were in Arizona and New Mexico (14.0 and 11.6, respectively), while the Texas border counties had by far the lowest rate (3.3).

Unintentional poisoning contributes to many injury deaths and it is a leading cause of death overall. For the border counties, unintentional poisoning was the thirteenth leading cause of death in 2004. However, when causes of death were ranked using the years of potential life lost (YPLL) methodology, unintentional poisoning emerged as the fifth leading cause of death in the border region.

Important differences were observed in unintentional poisoning death by age, sex, and ethnicity, as shown in **Figure 6** and **Table 8**. First, unintentional poisoning virtually did not exist as a cause of death among young children on the border: In 2004 only two unintentional poisoning deaths occurred among children aged 0 to 14 years in the 44 border counties. Thereafter the death rate rose rapidly with age, peaked at ages 45 to 54 years, and fell sharply in older age groups. Second, major differences were observed in poisoning death rates by sex and by ethnicity. The male death rate was more than double the female rate (11.0 and 5.0), while the non-Hispanic white death rate was almost three times the rate for Hispanics (12.1 versus 4.2).

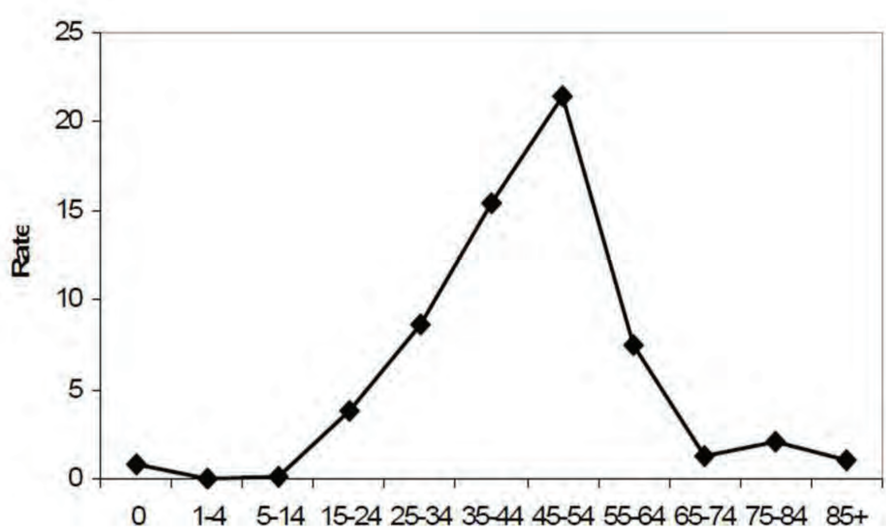

***Figure 6*: Unintentional poisoning death rates by age, U.S.-Mexico border counties, 2004**

Source: National mortality data, NCHS/CDC
Note: Rates are per 100,000 population.

	Rate	CI*
Both sexes	8.0	(7.3, 8.7)
Male	11.0	(9.8, 12.1)
Female	5.0	(4.3, 5.8)

	Rate	CI*
All ethnicities	8.0	(7.3, 8.7)
Hispanic	4.2	(3.4, 4.9)
non-Hispanic white	12.1	(10.4, 13.7)

Notes: Rates are per 100,000 population, age-adjusted to the US 2000 standard population.
CI* = 95% confidence interval
Source: National mortality data, NCHS/CDC

***Table 8*: Unintentional poisoning death rates by sex and ethnicity, U.S.-Mexico border counties, 2004**

Types of drugs used

Most unintentional poisoning deaths are the result of drug abuse involving either illegal or prescription drugs, or poisoning from legal drugs taken in error or at the wrong dose. Abuse of illegal and prescription drugs, along with misuse of prescription drugs, accounted for nearly 80 percent of all unintentional poisoning deaths on the border in 2004. Multiple cause of death data provide some information on the types of drugs used by these decedents. The data in **Table 9** are tabulated according to the first drug mentioned on the death certificate. Multiple drug use was reported in almost half (46 percent) of all such deaths; the largest number of illegal or prescription drugs used by a single decedent was seven. These deaths do not include deaths due to adverse effects of prescription drugs taken in the proper doses and as directed, which are coded elsewhere according to coding rules of the International Classification of Diseases, 10th Revision (ICD-10; WHO, 1992).

Of the 413 poisoning deaths caused by illegal and prescription drugs, more than one-third were caused by heroin and cocaine. Other opioids, which include many prescription analgesics such as codeine, oxycodone, and hydrocodone, accounted for nearly 31 percent of all unintentional deaths due to drug use. In addition, methadone, which is increasingly used as a prescription drug (Paulozzi, 2006), caused a significant proportion of drug-related unintentional deaths. The total proportion of drug-poisoning deaths due to prescription drugs (other opioids and methadone) was almost 42 percent. Other studies have shown that most of the growth in unintentional poisoning deaths in the United States in recent years has been due to increased use of opioid analgesics (Paulozzi, 2006). A study of drug use in New Mexico demonstrated that deaths from illegal drug use were more likely to occur in larger urban areas of the state, while deaths from abuse or misuse of prescription drugs were most common in the smaller urban and rural areas of the state (CDC, 2005).

Cause	Number	Percent
All causes	524	100.0
Illegal and prescription drugs	413	78.8
Other causes	111	21.2
Drug poisoning deaths by type of drug used:		
All drugs	413	100.0
Heroin	43	10.4
Other opioids	127	30.8
Methadone	45	10.9
Other synthetic narcotics	24	5.8
Cocaine	109	26.4
Other and unspecified drugs	65	15.8

Source: National mortality data, NCHS/CDC

***Table 9*: Unintentional drug poisoning deaths by cause, U.S.-Mexico border counties, 2004**

Falls

Falls are the third leading cause of unintentional injury death, both nationally and in the U.S.-Mexico border region. In 2004, falls caused 346 deaths in the 44 U.S. border counties, making falls the fifteenth leading cause of death on the border. Falls may lead to death both directly and indirectly. Falls are particularly important as a cause of injury among the elderly, as falls often lead to hip fracture. Among those aged 65 years or older, a hip fracture often results in an end to independent living and can begin the chain of events leading to death. Factors that contribute to falls among the elderly include difficulties in walking and balance, neurological and musculoskeletal disabilities, medications, dementia, and visual impairment (Tinetti, 1989).

Mortality due to unintentional falls rose slightly from 2000 to 2004 in the United States, increasing from 4.8 to 6.3 deaths per 100,000, but the rate did not change significantly in the border region. In 2004 the age-adjusted death rate due to falls on the U.S.-Mexico border was 5.4 per 100,000, slightly less than the national rate.

Table 10 provides 2004 fall mortality data for the United States, border states, border counties, and various subgroups. The border counties of Arizona and New Mexico had the highest fall death rates (7.9 and 8.2 per 100,000), while the rate was significantly lower in the border regions of California and Texas (5.2 and 3.2). In both the United States and the border region, the fall death rate was significantly higher for men than for women. In both cases the male death rate exceeded the female rate by 70 percent. In general, fall death rates were higher for non-Hispanic whites than for Hispanics. For the United States as a whole, the fall death rate for non-Hispanic whites was 32 percent greater than for Hispanics (6.2 versus 4.7); in the border counties the rate for non-Hispanic whites was 80 percent above the Hispanic rate (6.3 versus 3.5).

Area and category	Number	Rate	CI*
United States	18807	6.3	6.2, 6.4
Arizona	543	9.5	8.8, 10.5
California	1624	4.5	4.8, 5.2
New Mexico	225	11.8	11.0, 14.3
Texas	1051	4.7	5.6, 6.3
Border counties	**346**	**5.4**	**4.8, 5.9**
Arizona border	110	7.9	6.4, 9.4
California border	152	5.2	4.4, 6.1
New Mexico border	26	8.2	5.0, 11.3
Texas border	58	3.2	2.4, 4.0
United States			
- Male	9856	8.2	8.0, 8.4
- Female	8951	4.8	4.7, 4.9
- Hispanic	978	4.7	4.4, 5.0
- Non-Hispanic whites	16379	6.2	6.1, 6.3
Border counties			
- Male	190	4.1	3.4, 4.8
- Hispanic	73	3.5	2.4, 4.7
- Non-Hispanic white	258	6.3	5.0, 7.6

Notes: Rates are per 100,000 population, age-adjusted to the US 2000 standard population.
CI* = 95% confidence interval
Source: National mortality data, NCHS/CDC

***Table 10*: Unintentional drug poisoning deaths by cause, U.S.-Mexico border counties, 2004**

Deaths due to falls increase significantly with age. **Figure 7** provides the fall death rate by age for the total population of the U.S.-Mexico border counties in 2004. The death rate from falls rose very gradually with age before age 65, but increased at an exponential rate for the older age groups.

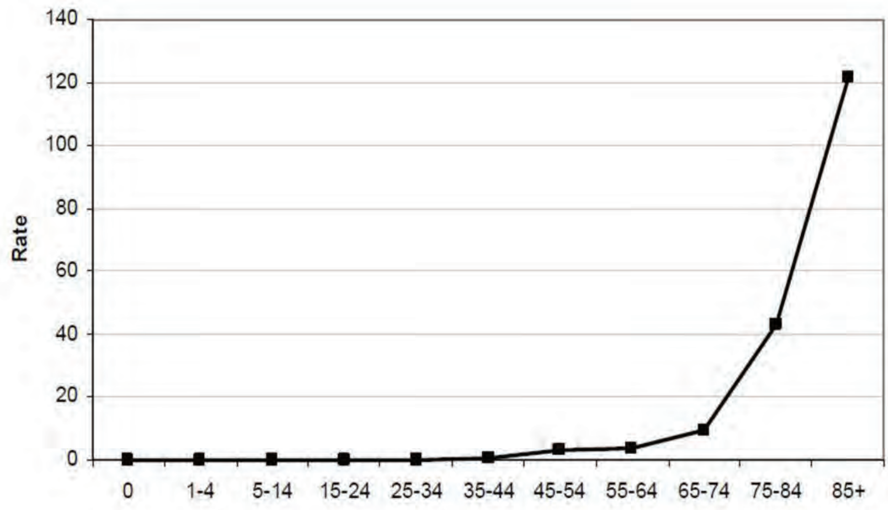

***Figure 7*: Unintentional fall death rates by age, U.S.-Mexico border counties, 2004**

Source: National mortality data, NCHS/CDC

Violence: Homicide and Suicide

Violence, in the form of homicide and suicide, contributes notably to overall mortality both nationally and on the border. Homicides appear disproportionately among the young, and teenage suicide is a growing concern. The homicide death rate in the United States is by far the highest of any industrialized country. Based on data from the Organization for Economic Cooperation and Development (OECD; 2007), in 2002 the U.S. rate was 12 times that in the United Kingdom, 10 times that in Italy, and more than double that in the next highest country, Finland. However, the United States has one of the lowest suicide rates of any industrialized country. Sixteen OECD member countries reported higher rates in 2002, with the highest rate (Hungary, 23.2) more than double the U.S. suicide death rate of 10.2.

Homicide

In 2004, homicide (death by assault) was the sixteenth leading cause of death in the U.S.-Mexico border counties and the fifteenth leading cause of death in the United States. There were 17,357 homicides in the United States in that year, 326 of which occurred in the border region. In both areas, homicide was the second leading cause of death for the age group 15 to 24 years. The U.S. age-adjusted homicide death rate has remained at approximately 6.0 per 100,000 population since 2000, with the exception of the spike in 2001 related to the September 11 events.

The homicide rate is generally higher for the border states than for the United States, while the border county rate is lower than the national rate, as shown in **Table 11**. Among border states, Arizona and New Mexico had the highest homicide death rates in 2004 (8.8 and 9.1), significantly higher than the statewide rates in California (6.7) and Texas (6.1). The homicide rate for the border counties was 4.6, significantly lower than the national rate (5.9). Among border counties, those in Arizona had the highest homicide rate (8.3), significantly higher than the border counties of the other states. The border area of Texas had by far the lowest homicide death rate (2.8). Significant differentials by sex and ethnicity also existed within the border region. The male homicide death rate was about three times the female rate for the border counties, somewhat less than the four-to-one ratio at the national level. The homicide death rate for Hispanics was higher than for non-Hispanic whites both nationally and on the border, although the disparity in homicide rates was much smaller in the border region.

	Homicides			Suicides		
	Number	Rate	CI*	Number	Rate	CI*
United States	17,357	5.9	5.8, 6.0	32,439	10.9	10.8, 11.1
Arizona	511	8.8	8.1, 9.6	880	15.7	14.7, 16.8
California	2,481	6.7	6.5, 7.0	3,366	9.6	9.3, 9.9
New Mexico	171	9.1	7.7, 10.5	360	18.9	16.9, 20.9
Texas	1,410	6.1	5.8, 6.5	2,301	10.7	10.2, 11.1
Border counties	**326**	**4.6**	**4.1, 5.1**	**724**	**10.9**	**10.1, 11.7**
Arizona border	101	8.3	6.7, 10.0	188	15.0	12.8, 17.1
California border	145	4.5	3.8, 5.3	329	10.9	9.7, 12.1
New Mexico border	16	**	**	61	19.7	14.7, 24.7
Texas border	64	2.8	2.1, 3.4	146	7.2	6.0, 8.4
United States						
- Male	13578	9.2	9.0, 9.3	25,566	17.5	17.3, 17.7
- Female	3779	2.6	2.5, 2.6	6,873	4.5	4.4, 4.6
- Hispanic	3271	7.2	6.9, 7.4	2,207	5.9	5.6, 6.2
- Non-Hispanic white	5427	2.2	2.2, 2.3	27,001	11.0	10.8, 11.1
Border counties						
- Male	257	7.2	6.3, 8.1	559	17.7	16.2, 19.2
- Female	69	2.0	1.5, 2.5	165	4.9	4.1, 5.6
- Hispanic	169	4.6	3.9, 5.3	177	5.5	4.7, 6.4
- non-Hispanic white	89	3.2	2.5, 3.8	490	16.1	14.6, 17.5

Notes: Rates are per 100,000 population, age-adjusted to the US 2000 standard population
*CI = 95% confidence interval
** Figure does not meet standards for reliability or precision.
Source: National mortality data, NCHS/CDC

***Table 11*: Homicide and suicide deaths and death rates, United States and U.S.-Mexico border, 2004**

Prevention of homicides requires a variety of activities, many of which are proposed in Healthy People 2010, a national health education and health promotion program (U.S. Department of Health and Human Services [U.S. HHS], 2000). Implementing these strategies will require comparable data sources and standardized definitions. Without standardization, it is impossible to pursue strategies such as identifying and tracking subcategories of assault.

Suicides

Although the U.S. suicide death rate is lower than in many other countries, suicide remains the eleventh leading cause of death for the United States. Suicide is even more important on the U.S.-Mexico border, where it is the tenth leading cause of death. Suicide is a concern at any age, but teenage suicide represents a great loss not only to the individual but to society as well. When causes of death were ranked using the YPLL methodology, suicide was the fourth leading cause of death on the border.

Table 11 provides information on suicide death rates for the nation, border states, and border counties in 2004. Suicide death rates in the states of Arizona and New Mexico (15.7 and 18.9) were significantly higher than the national rate of 10.9. However, the suicide death rate for the 44 border counties was 10.9, the same as the national rate. The border counties of Arizona and New Mexico had the highest suicide death rates in the border area (15.0 and 19.7), while the Texas border counties had the lowest rate (7.2). As with homicides, the male suicide rate was nearly four times the female rate, both nationally and in the border counties. The ethnic differences in suicide death rates, however, were the opposite of the homicide differentials, with the rate among non-Hispanic whites much higher than among Hispanics. Nationally, the non-Hispanic white suicide death rate was nearly two times the Hispanic rate, while on the border the non-Hispanic white rate was nearly three times the Hispanic rate. Nonetheless, suicide remains the twelfth leading cause of death among border Hispanics.

Suicide is uncommon among children under 10 years of age, but suicide deaths increase rapidly beginning at age 15. Teenage suicides are of particular concern as it is the third leading cause of death among the 15 to 24 year age group, both nationally and on the border. **Figure 8** provides suicide death rates for 15 to 24 year olds for the United States, border states, and border counties. To produce stable rates for the border counties, data were combined for the years 2002-2004. The state rates for Arizona and New Mexico (16.8 and 20.1) were significantly higher than the national rate (10.0), and the same was true for the border counties of Arizona (14.3). The death rate for the New Mexico border counties (13.3) also exceeded the national rate, but the difference was not statistically significant.

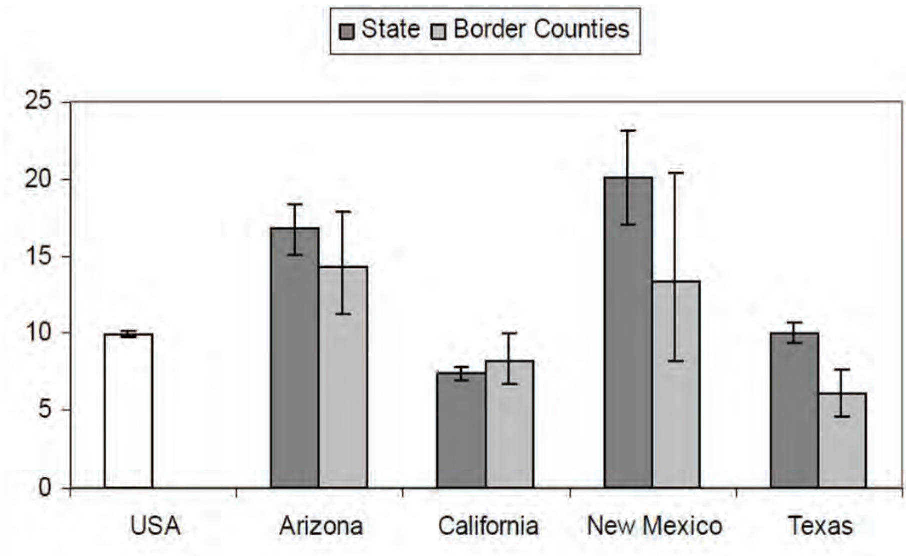

***Figure 8*: Suicide death rate for 15-24 year olds, United States, U.S.-Mexico border states, and border counties, 2002-2004**

Source: National mortality data, NCHS/CDC

Suicide is a preventable public health problem, although suicides and suicide attempts are difficult to predict. The most common risk factors for suicide include depression and other mental disorders, stressful life events, prior suicide attempt, a family history of mental disorder, a family history of suicide, and access to lethal suicide methods such as firearms (NIMH, 2006). The difficulty in predicting suicide means that most prevention programs focus on the known risk factors. Promising approaches to suicide prevention include recognition and treatment of mental disorders and drug abuse, along with reduction in access to lethal methods (Moscicki, 2001). Suicide prevention programs for the border need to use interventions targeted to the appropriate risk factors for various age, ethnic, and cultural groups. Chapter 10, "Mental Health" contains information for the border region on depression and other mental health problems that may be associated with suicide.

Injury Deaths in Early Childhood

In 2004, injury was the third leading cause of death in early childhood, defined as birth to four years of age. Beyond the first year of life however, intentional and unintentional injuries were the leading cause of death, accounting for nearly 40 percent of all deaths among border children one to four years of age (data not shown). Injury causes a much smaller proportion of deaths during the first year of life (4 percent), but a surprising number of injury deaths occurred even in infants.

Figure 9 provides the distribution of early childhood injury deaths by cause in 2002-2004 separately for the United States and the border counties. As with other age groups, motor vehicle crashes were the leading cause of injury death for both areas (22 percent for the United States, 30 percent for the border). Homicides were the second leading cause of injury death in early childhood, accounting for nearly the same proportion of deaths as motor vehicle crashes: 20 percent for the United States and for the border counties.

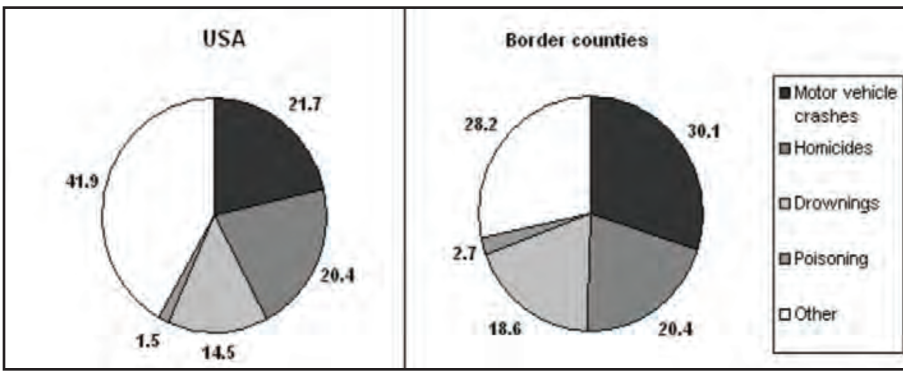

***Figure 9*: Percent distribution of the leading causes of injury death in children 0-4 years of age, United States and border counties, 2002-2004**

Source: National mortality files, NCHS/CDC

Drowning was the third leading cause of injury death for children under five years of age. Drowning caused 15 percent of early childhood injury deaths for the United States and 19 percent of those deaths in the border region. As mentioned earlier, poisoning was not an important cause of early childhood death. Homicides and drownings accounted for a much larger proportion of injury deaths in early childhood than at other ages, although the total number of injury deaths in early childhood was relatively small. The proportion of injury deaths due to motor vehicle crashes and drownings was larger on the border than for the United States as a whole. However, there was no statistically significant difference in the death rates due to these causes.

Conclusion and Recommendations

Unintentional and intentional injuries are a major health problem in the U.S.-Mexico border region and often go unmentioned in discussions of border health. Unintentional injuries account for five percent of all border deaths, and they are the fourth leading cause of death in the region — second if ranked in terms of the number of years of potential life lost. Combined with intentional injury deaths, these external causes represent 7.5 percent of all deaths in the border area, more than any other cause except heart disease and cancer. If considered separately, four external causes of death would be ranked among the 15 leading causes of death: motor vehicle crashes (eighth), suicides (tenth), unintentional poisoning (thirteenth), and falls (fifteenth). A fifth external cause of death, homicide, is the sixteenth leading cause of death in the border region.

While injury is a public health issue everywhere on the border, some causes of injury are more common in certain areas and in certain ethnic groups. In general, injury death rates are higher in Arizona and New Mexico, both statewide and in the border counties, than in California and Texas. This is true for both unintentional and intentional injuries. Regarding specific causes of injury, the death rate due to motor vehicle crashes is higher than the national rate in the border counties of Arizona and New Mexico. In one cluster of border counties in West Texas the motor vehicle crash death rate is more than three times the national rate. In the states of Arizona and New Mexico, as well as in their border counties, the death rate due to unintentional poisoning is substantially higher than the U.S. rate. Deaths due to falls are more common in the border area of Arizona than elsewhere on the border. The death rate from intentional injuries (homicide and suicide) is higher in Arizona and New Mexico, both statewide and on the border. For Hispanics, injury death rates are higher for motor vehicle deaths (among those 15 to 24 years of age) and for homicides. For non-Hispanic whites, death rates are higher for unintentional poisoning, falls, and suicides. For all the major causes of injury death, including falls, the rates are much higher for men than for women.

Unintentional injuries often are thought of as random events or accidents – outcomes that could not be prevented. Extensive research on injuries has demonstrated that many of these events are, in fact, predictable. Predictability implies that many injuries can be prevented, typically by addressing risk factors for various causes of injury. Other programs can mitigate the severity of injury, saving lives or reducing the medical or other costs that result from injury. Intentional injuries similarly can be prevented by addressing known risk factors for assault or suicide.

Public health, mental health, and public safety groups need to work together in designing interventions that target known risk factors for various causes of injury. These intervention programs should be culturally and linguistically appropriate, and should be aimed at specific groups of the border population. Examples of these interventions include:

- Enforcement of existing laws, such as for road traffic safety.
- Enhanced supervision of high-risk groups, such as very young and elderly drivers, underprivileged youth, and others.
- Education programs related to proper driver and pedestrian behavior, injury

prevention for children (bicycle helmets), physician education regarding usage of drugs in the treatment of pain and psychiatric problems, and others.

- Outreach programs aimed at activities for underprivileged youth, exercise programs for the elderly, drug counseling, suicide prevention, treatment of mental health disorders, and poison control centers.

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CHAPTER 10

MENTAL HEALTH

Mental health is an essential component of health and well-being. Ensuring mental well-being has been identified as a public policy priority in the United States (New Freedom Commission on Mental Health, 2003; U.S. Department of Health and Human Services [HHS], 1999, 2001). Poor mental health is associated with reduced quality of life, death, and a number of direct social costs. These include treatment costs, family resources (McGuire, 2002), reduced work hours and absenteeism, and lower productivity, (Ettner, 1997, 2000; Kessler, 1997, 1999). Similarly, substance use is associated with health and social burdens such as treatment, crime, reduced labor market participation and death (Office of National Drug Control Policy, 2004).

Poor mental health affects women and men of all racial and ethnic groups (Kessler, 2003a, 2003b, 2005a; Ojeda, 2006). Disparities in access to mental health and substance use treatment services by race/ethnicity, nativity (i.e., U.S.- vs. foreign-born), and socioeconomic status are well-documented (Alegria, 2002; Kessler, 1999, 2005b; Ojeda 2006; Vega, 1999, 2001). Ethnic minorities, immigrants, and low-income persons face diverse barriers in accessing mental health services, including financial and health system barriers, psychosocial barriers such as stigma, or obstacles to timely or appropriate care due to language differences (HHS, 1999, 2001). However, effective treatments are available for many conditions (HHS, 2001), making it critical that individuals who need care are able to obtain timely, affordable, and culturally appropriate treatments.

The U.S.-Mexico Border Health Commission (2003) has identified mental health as a priority issue of Healthy Border 2010. The Healthy Border objective that directly focuses on mental health is: Reduce suicide mortality by 15 percent, from 11.0 to 9.4 deaths per 100,000 population.

Report Objectives

To date, numerous studies have reported on national and regional patterns of psychiatric morbidity, including by race and ethnicity (Alegria, 2007; Grant, 2004; Ojeda, 2006; Vega, 1998). However, data on the prevalence of mental illness and substance use and on the prevalence of utilization of mental health and substance use services in the U.S.-Mexico border region have not been previously examined. This chapter aims to fill this gap by addressing these issues.

First, the prevalence of two mental health status indicators (i.e., Serious Psychological Distress and Major Depressive episode) and the use of any mental health services during the prior year was reported. The second section is devoted to examining the prevalence of illicit substance use and substance use treatment services. Where possible, the experiences of adult Hispanics and non-Hispanics and by nativity is reported.

Methods

This chapter investigates the relationships between ethnicity (Hispanic vs. non-Hispanic) and nativity (U.S.- vs. foreign-born) and various mental health and substance use and treatment indicators, nationally and in U.S. counties on the U.S.-Mexico border. The U.S. border counties are defined as counties in the United States that are within the 100-kilometer limit of the U.S.-Mexico border.

Data are from aggregated waves of the 2004-2005 and 2002-2005 Substance Abuse and Mental Health Services Administration's (SAMHSA) National Survey on Drug Use and Health (NSDUH), a population-based survey. The NSDUH is the primary source of information on the use of illicit drugs, alcohol, and tobacco by the civilian, noninstitutionalized population of the United States. The NSDUH interviews persons aged 12 years or older, although this chapter focused on adults aged 18 or older. The survey also collects data on mental illness, including serious psychological distress and major depression. Data from the survey can be used to examine the co-occurrence of substance use and mental health disorders. Since 1999, the NSDUH interview has been carried out using computer-assisted interviewing (CAI). Most of the questions are administered with audio computer-assisted self interviewing (ACASI). Data were analyzed with SUDAAN, a software package that accounts for the survey's complex sample design. Statistical significance was assessed by examination of overlap of 95 percent confidence intervals. Since sample sizes were insufficient to report on individual counties and border states, data are reported for the nation and aggregated for all border counties, henceforth, the border region.

Using the NSDUH data, the prevalence of serious psychological distress in the prior year, the prevalence of major depressive episode in the prior year, use of any mental health treatment in the prior year, and unmet need for mental health treatment in the prior year was examined. Lifetime use of any illicit drug, prior year use of any illicit drug, prior year use of substance use treatment, and lifetime use of substance use treatment was also examined.

This text provides a brief summary of the mental health and treatment measures analyzed. Serious psychological distress is defined as having a score of 13 or higher on the K6 Scale (Kessler, 2002, 2003c). Serious psychological distress is a non-specific measure of mental illness and refers to the presence, at some time in the prior year, of a diagnosable mental, behavioral, or emotional disorder meeting criteria described in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), excluding substance use disorder, and which also resulted in functional impairment or significant interference with or limitation of activities of daily living and instrumental activities of daily living.

Major depressive episode is defined as a period of at least two weeks in the previous year when a person experienced a depressed mood or loss of interest or pleasure in daily activities and had a majority of the symptoms for depression as described in DSM-IV.

Mental health treatment is defined as having received inpatient or outpatient care or having used psychotropic medications for problems with emotions, nerves, or mental health. Unmet need for mental health treatment is defined as a perceived need for treatment that was not received.

This chapter also reports on illicit drug use and treatment. Illicit drugs are defined as: marijuana/hashish, cocaine (including crack), heroin, hallucinogens, inhalants, and prescription-type psychotherapeutics used nonmedically. Substance use treatment refers to treatment received in order to reduce or stop illicit drug or alcohol use, or for medical problems associated with illicit drug or alcohol use. It includes treatment received at any location, such as a hospital, rehabilitation facility (inpatient or outpatient), mental health center, emergency room, private doctor's office, self-help group, or prison/jail (SAMSHA, 2006).

Mental Health Status

Mental health status can be assessed through clinical interviews, validated scales in population-based surveys, mortality rates due to suicide, and in other ways. Two indicators of mental health status occurring within the prior 12 months were examined: Serious Psychological Distress (Kessler, 2002, 2003c), which is a nonspecific measure of mental illness, and occurrence of a Major Depressive

Episode, also referred to as major depression. The prevalence of these two measures for adults only as they were unmeasured in youths was reported. Nationally, one of every eight (11.6 percent) adults experienced serious psychological distress (**Figure 1**). When data are examined by ethnicity, a slightly lower proportion of non-Hispanics (10.2 percent) and slightly higher proportion of Hispanics (12.8 percent) had experienced serious psychological distress in the prior year. Nevertheless, rates for border counties or by Hispanic status were not statistically different from national rates.

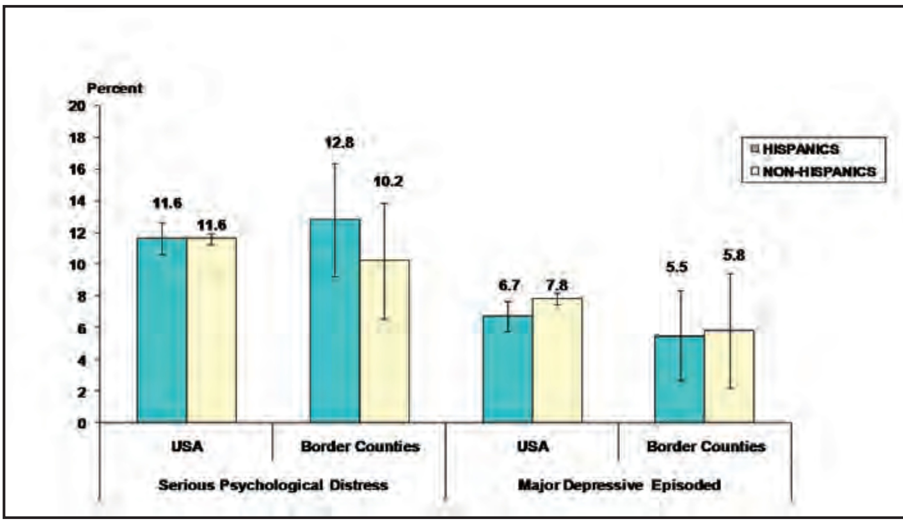

***Figure 1*: Prevalence of serious psychological distress and major depression during previous 12 months, 18 years and older, United States and all border counties, 2004-2005**

Compared to serious psychological distress, the prevalence of major depression was significantly lower for Hispanics and non-Hispanics, both nationally and in border counties. For example, 5.8 percent of non-Hispanics in border counties had experienced an episode of major depression in the prior year, as had 5.5 percent of Hispanics; these differences are not statistically different.

When data were disaggregated by Hispanic status and nativity, greater variation in rates of psychological distress were observed, both nationally and in border counties, as shown in **Figure 2**. Nationally, U.S.-born Hispanics exhibited the highest rate (15.4 percent) of psychological distress in the prior year compared to other groups. Among immigrant populations, national rates of psychological distress were similar for Hispanics and non-Hispanics (8.8 percent and 8.2 percent, respectively). Border county rates were within the range of national rates and confidence intervals were wide, hence differences were not statistically significant. Nevertheless, the data suggest that a greater proportion of immigrant Hispanics residing in the border region had experienced psychological distress in the prior year compared to immigrants nationwide (12.4 percent vs. 8.8 percent, respectively).

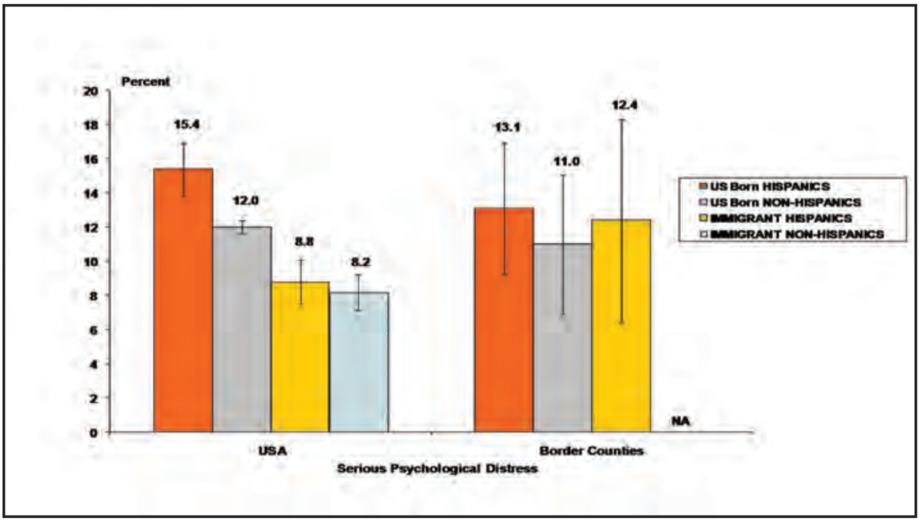

***Figure 2*: Prevalence of serious psychological distress by Hispanic ethnicity and nativity, United States and all border counties, 18 years and older, 2004-2005**

Data on major depression by Hispanic status and nativity suggest that rates for border counties are within the range of national data, as depicted in Figures 1 and 3. Nationally, native-born Hispanics and non-Hispanics reported similar rates of major depression, about 8 percent each (**Figure 3**). Immigrant Hispanics and non-Hispanics also exhibited similar rates of major depression (approximately 5 percent for each). However, immigrants' rates of major depression were slightly lower than those of their native-born counterparts. Data

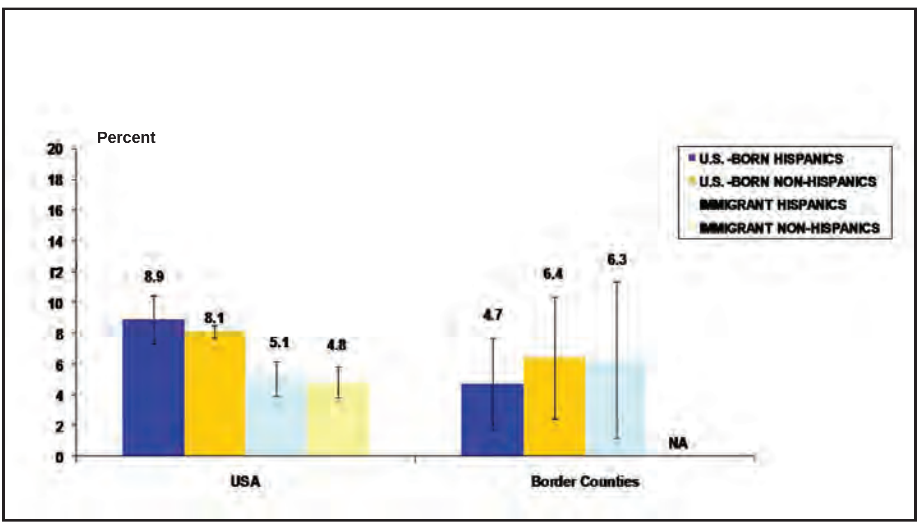

***Figure 3*: Prevalence of major depression, past year, by Hispanic status and nativity, United States and all border counties, ages 18 and older, 2004-2005**

for major depression among Hispanics and non-Hispanics residing in border counties had wide confidence intervals and thus did not appear to be statistically different from national rates.

Utilization of Mental Health Services

Individuals with mental disorders can benefit from timely treatment (HHS, 1999, 2001). We examined the prevalence of use of mental health services by all adults in the United States, disaggregating data by Hispanic status and nativity where possible. In addition, we report on the proportion of adults reporting unmet need for mental health care. Unmet need refers to persons who believed they needed mental health treatment but did not receive it.

Nationally, Hispanics were less likely to have obtained any mental health care than non-Hispanics (7.8 percent vs. 13.7 percent, respectively), as shown in **Figure 4**. This pattern is consistent with previously published literature which identifies gaps in mental health service use among Hispanics (Alegria, 2002; Ojeda, 2006; Wells, 2001). The gap in mental health service use between Hispanics and non-Hispanics is even greater and statistically significant in border counties: Only 6.6 percent of Hispanics obtained any mental health care, compared to 14.5 percent of non-Hispanics. Fewer persons reported unmet need for mental health care and differences between Hispanics and non-Hispanics were statistically nonsignificant. For example, in the border region, 3.9 percent of Hispanics reported unmet need for mental health treatment, compared to 3.5 percent of non-Hispanics.

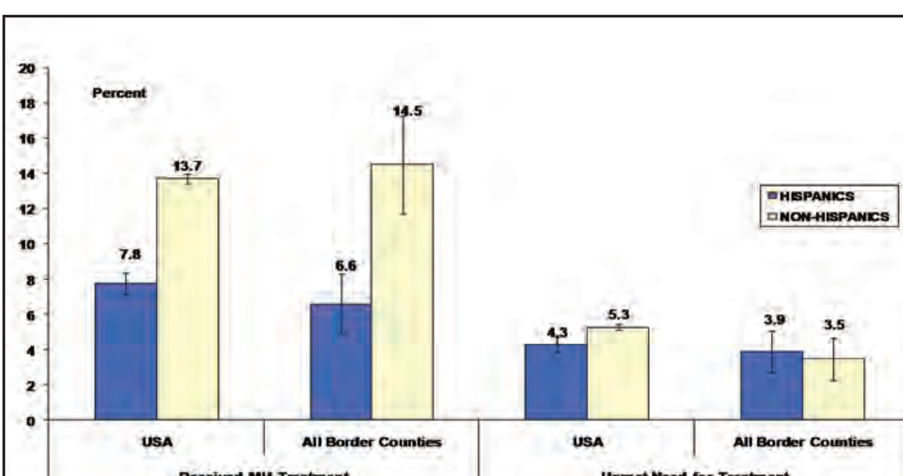

***Figure 4*: Mental health service use and unmet need for mental health treatment during previous 12 months by Hispanic status, ages 18 and older, United States and all border counties, 2002-2005**

Figure 5 depicts clear differences in use of mental health services by both ethnic group and nativity. Mental health treatment rates were higher for U.S.-born Hispanics and U.S.-born non-Hispanics, nationally. In the border region, U.S.-born non-Hispanics were most likely to obtain mental health treatment (14.8 percent). Notably, U.S.-born Hispanics were twice as likely as immigrant Hispanics in border counties to obtain mental health treatment (8.6 percent vs. 4.4 percent, respectively).

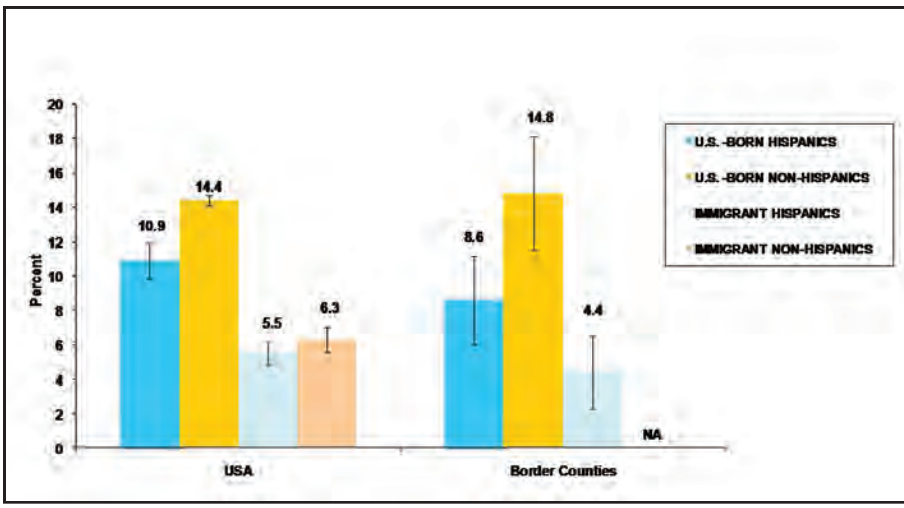

***Figure 5*: Use of any mental health treatment during previous 12 months, by Hispanic status and nativity, 18 years and older, United States and all border counties, 2002-2005**

Report of unmet need for mental health care also varied by nativity, as shown in **Figure 6**. Nationwide, U.S.-born adults, both Hispanic and non-Hispanic, were approximately twice as likely to report not receiving needed mental health care as were immigrants, regardless of ethnicity (about six percent for U.S.–born adults vs. about three percent for immigrants). Rates of perceived unmet need for mental health care were undifferentiated among border county residents.

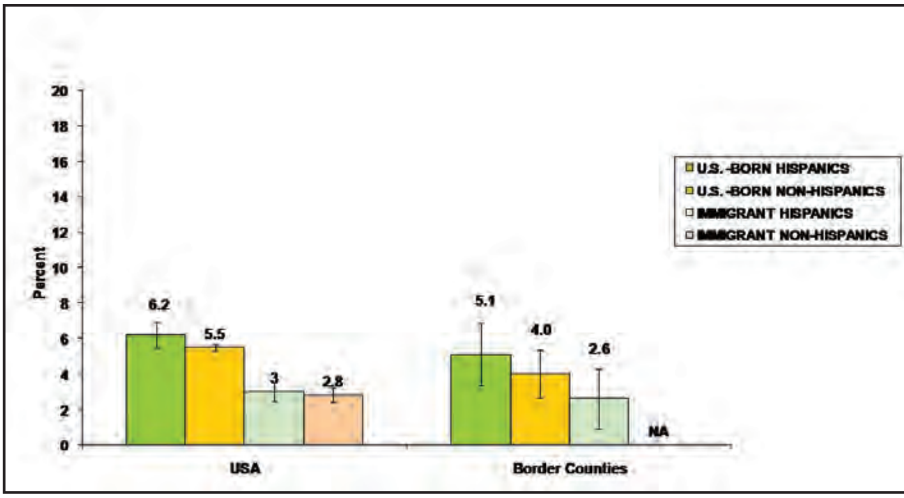

Figure 6**: Unmet need for mental health treatment during previous 12 months by Hispanic status and nativity, ages 18 and older, United States and all border counties, 2002-2005**

Mental Health Service Use by Adults with Probable Need for Care

It is also important to know whether adults with mental health service needs accessed mental health services. Data from the 2004-2005 waves of the National Survey of Drug Use and Health indicate that 27.7 percent of Hispanics who met criteria for serious psychological distress in the prior year obtained mental health care during that time period versus 46.4 percent of non-Hispanics (data not shown). Among adults experiencing a major depressive episode in the prior year, 37.6 percent of Hispanics obtained mental health care compared to 55.9 percent of non-Hispanics (data not shown).

Differences by nativity in mental health service use by adults with symptoms of poor mental health were also observed. For example, 48.1 percent of U.S.-born non-Hispanics experiencing serious psychological distress obtained mental health care as compared to 22.5 percent of foreign-born non-Hispanics (data not shown).

For adults experiencing major depression, differences by nativity remained stark: 57.0 percent for U.S.-born non-Hispanics vs. 37.8 percent for immigrant non-Hispanics. Among Hispanics, differences in mental health service use were less pronounced by nativity, yet overall use was lower for both immigrants and natives. For example, among Hispanic adults meeting criteria for serious psychological distress, 32.8 percent of natives obtained mental health care compared to 21.0 percent of immigrants. Figures were slightly higher among those with major depression: 42.4 percent among U.S.-born Hispanics vs. 31.0 percent of immigrant Hispanics (data not shown).

Illicit Substance Use

Use of illicit drugs is a pervasive national concern because of the great social, economic, and other costs associated with this behavior (Office of National Drug Control Policy, 2004). This section addresses drug use behaviors by Hispanic and non-Hispanic adults in the United States and border counties.

Figure 7 provides data on the self-reported use of any illicit drugs during the previous 12 months and during the person's lifetime. Nationwide and in the border region, Hispanics were less likely to report having used any illicit drug at any point during their lives than were non-Hispanics. For example, nationally 49.3 percent of non-Hispanics reported using any illicit drugs during their lifetime compared to 38.2 percent of Hispanics. In the border region, ethnic group differences were similar (35.2 percent for Hispanics vs. 50 percent of non-Hispanics). Data on prior-year drug consumption indicate that there were no significant differences between Hispanics and non-Hispanics, either nationally or in border counties; furthermore, rates between border counties and the United States did not differ.

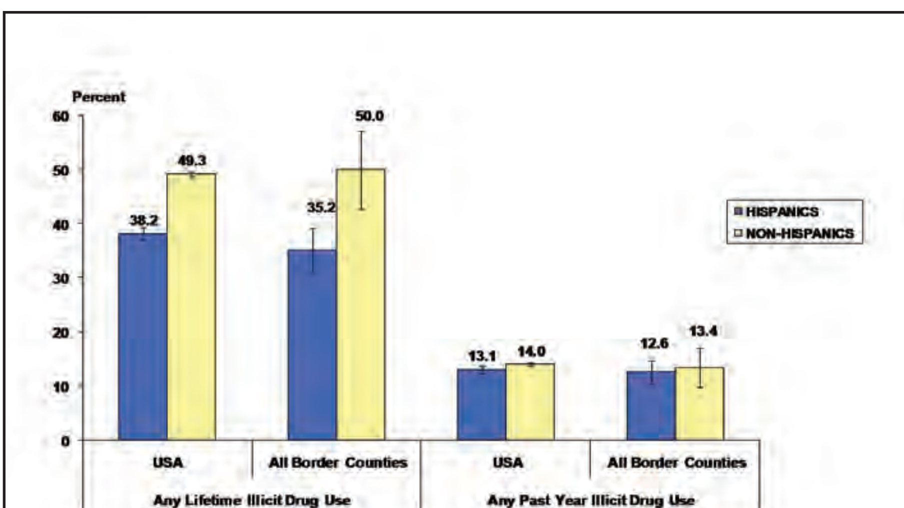

***Figure 7*: Lifetime and past year use of illicit drugs by Hispanic status, United States and all border counties, 2002-2005**

There were important differences in illicit drug use behaviors by immigrant status, as shown in **Figure 8**. U.S.-born adults were approximately twice as likely to have used illicit drugs during their lifetime compared to immigrants. At the national level, 56.1 percent of U.S.-born Hispanics reported illicit drug use vs. 24.9 percent of immigrant Hispanics. Among the non-Hispanic population, 51.3 percent of U.S.-born non-Hispanics reported illicit drug use at some point in their lives, vs. 28.8 percent of immigrant non-Hispanics. Significantly, U.S.-born Hispanics in the border region were less likely to have used any illicit drugs during their lifetime compared to the national rate (43.9 percent vs. 56.1 percent, respectively). In the border region, U.S.-born Hispanics exhibited a lower rate of lifetime drug use compared to U.S.-born non-Hispanics; however, the difference was not statistically significant (43.9 percent vs. 52.3 percent). In contrast, immigrant non-Hispanics reported a lifetime drug use rate that was 7.1 percentage points higher than that of immigrant Hispanics (32.8 percent vs. 25.7 percent respectively), yet this difference was nonsignificant.

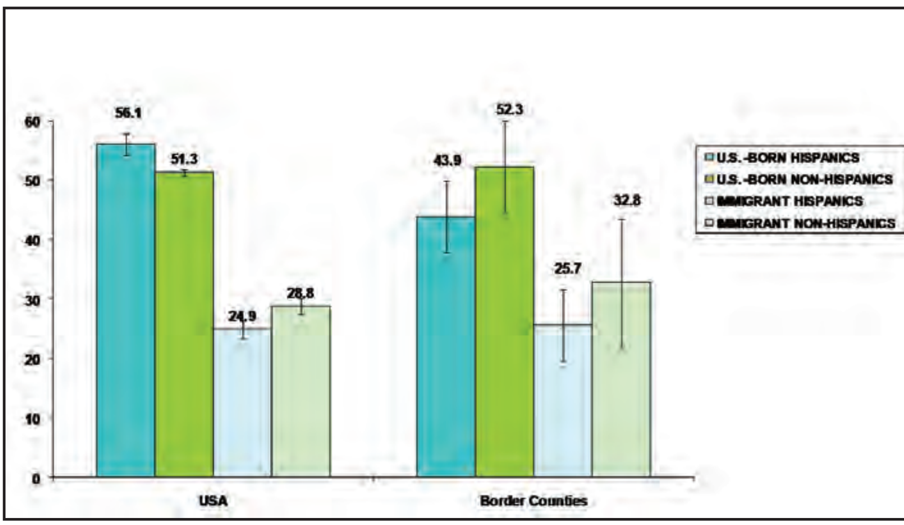

***Figure 8*: Any lifetime use of illicit drugs, by Hispanic status and nativity, ages 18 and older, United States and all border counties**

In the United States, use of illicit drugs in the prior year varied by Hispanic ethnicity and nativity, as illustrated in **Figure 9**. Nationally, U.S.-born Hispanics consumed illicit drugs at a statistically higher rate than non-Hispanics in the prior year (20.6 percent vs. 14.6 percent). Additionally, U.S.-born Hispanics were statistically more likely to have consumed illicit drugs in the prior year compared to their immigrant peers. For example, in border counties 17.2 percent of U.S.-born Hispanics reported any illicit drug use in the prior year compared to 7.7 percent of immigrant Hispanics. U.S.-born non-Hispanics were twice as likely to report any illicit drug use in the prior year compared to immigrant non-Hispanics (14.3 percent vs. 7.0 percent, respectively). Notably, however, differences between immigrant Hispanics and immigrant non-Hispanics were not statistically different nationally or in border counties.

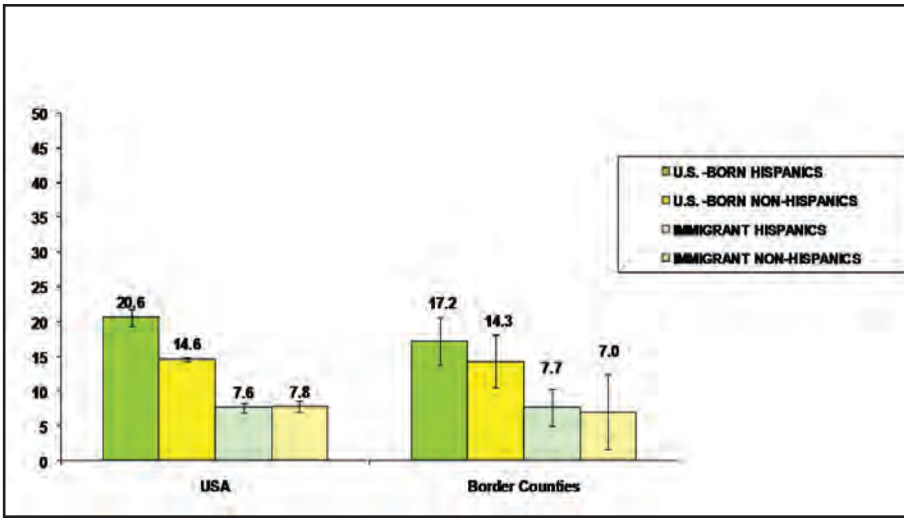

Figure 9: **Any past year use of illicit drugs by Hispanic status and nativity, ages 18 and older, United States and all border counties, 2002-2005**

Utilization of Substance Use Treatment Services

Lifetime consumption of any substance use treatment services was low among both Hispanics and non-Hispanics. Nationally, Hispanics were significantly less likely to have obtained substance use treatment compared to non-Hispanics (4.9 percent vs. 6.5 percent), as shown in **Figure 10**. There was roughly a two percentage point difference in the use of drug treatment services by Hispanic and non-Hispanic residents of the border region (5 percent vs. 7.4 percent), however, this difference was not statistically significant.

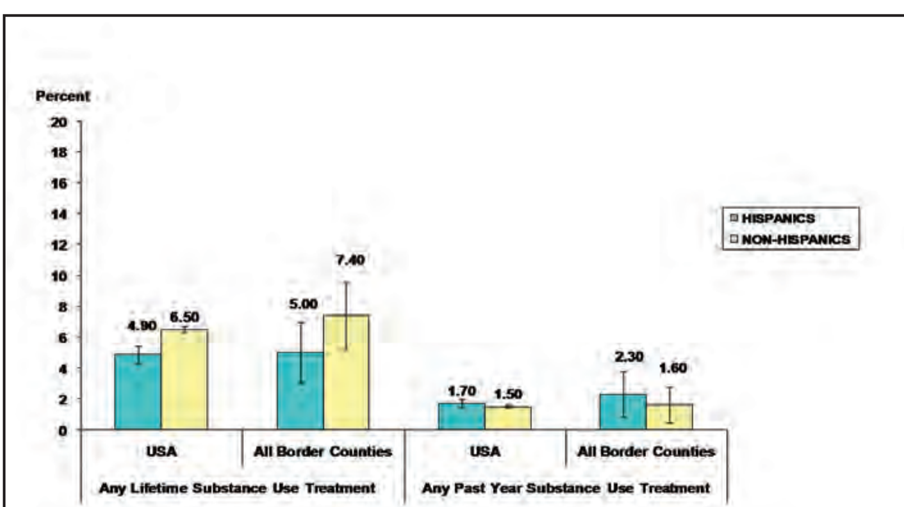

Figure 10: **Lifetime and past-year utilization of substance use treatment services by Hispanic status, ages 18 and older, United States and all border counties, 2002-2005**

Prior year use of drug treatment services was lower than lifetime use rates. Nationally and in the border region, roughly two percent of Hispanics and non-Hispanics had obtained substance use treatment in the prior year, and no differences were observed by ethnic group.

Disaggregating substance use treatment data by nativity indicates important gaps in access, especially among immigrant subgroups (**Figure 11**). In the United States, native-born adults were at least twice as likely to obtain substance use treatment as their immigrant peers. Among Hispanics, 7.4 percent of the U.S.-born obtained substance treatment compared to 3.1 percent of immigrants; among non-Hispanics, 6.9 percent of the U.S.-born obtained treatment versus 2.3 percent of immigrants. Nationally, U.S.-born Hispanics and non-Hispanics consumed substance use treatment services at a similar rate (about 7 percent for each), while differences between immigrants were modest. Border county data suggest that use of substance use treatment services was similar for U.S.-born Hispanics (5.0 percent) and non-Hispanics (7.6 percent) and immigrant Hispanics (5.0 percent). Data for immigrant non-Hispanics residing in the border were unavailable due to insufficient sample sizes.

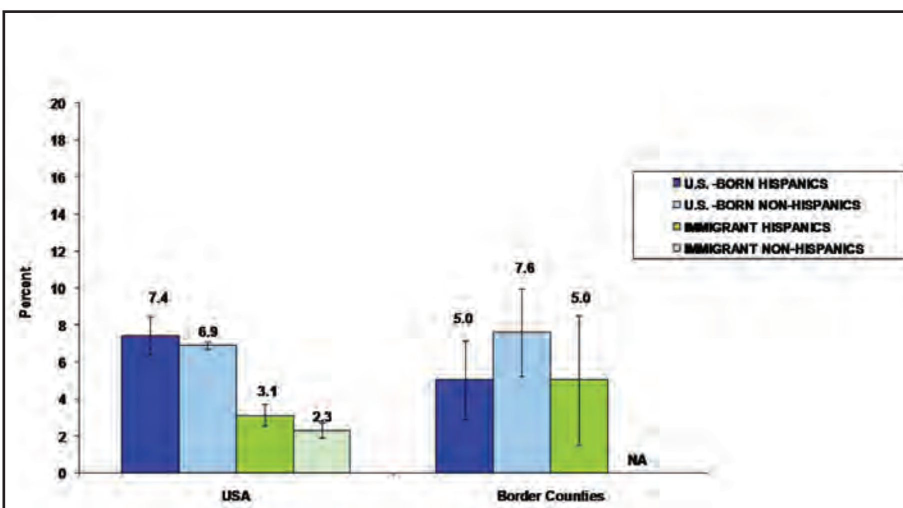

***Figure 11*: Any lifetime utilization of substance use treatment services, by Hispanic status and nativity, ages 18 and older, United States and all border counties, 2002-2005**

Consumption of substance use treatment services are low nationally and especially low in the border region, where data display wide confidence intervals (see **Figure 12**). Only 2.5 percent of U.S.-born Hispanics, 1.6 percent of U.S.-born non-Hispanics, 1.1 percent of immigrant Hispanics, and 0.6 percent of immigrant non-Hispanics in the United States obtained substance use treatment in the prior year. Rates were not statistically different for border county residents.

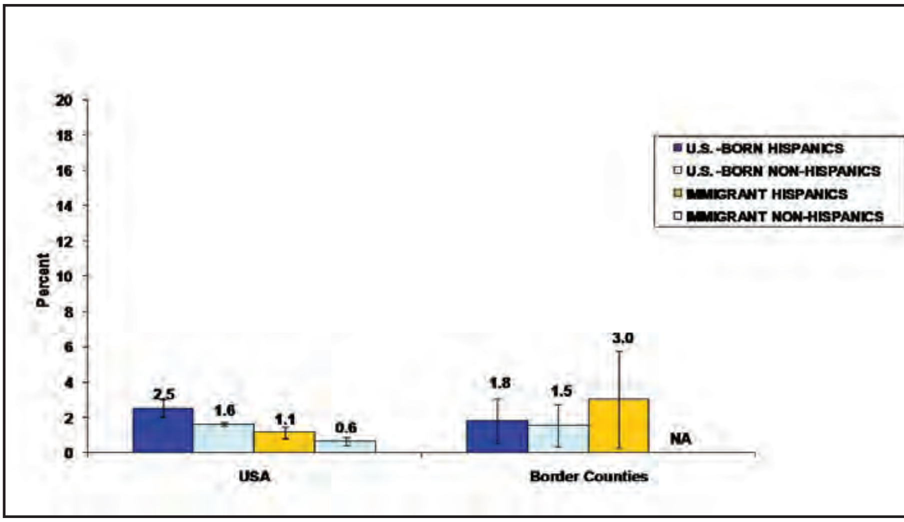

***Figure 12*: Past year utilization of substance use treatment services by Hispanic status and nativity, ages 18 and older, United States and all border counties, 2002-2005**

Conclusions and Recommendations

Poor mental health affects all residents of all regions, including communities on the U.S.-Mexico border, as evidenced by the data presented in this chapter. To our knowledge this is the first effort to examine the mental health status and use of mental health and substance use services in the U.S.-Mexico border region.

There were many similarities in mental health status across ethnic groups. However, important differences emerged when data were disaggregated by nativity. Nationally, a greater proportion of U.S.-born Hispanics and non-Hispanics reported psychological distress and major depression compared to their immigrant peers. Data on mental health service use indicated that, both nationally and in the border region, Hispanics in particular were underserved by mental health providers. Therefore, improving access to culturally competent mental health services for Hispanics, including immigrants, is critical for ensuring the health of this population.

Economic factors, including access to health insurance coverage, may influence timing and use of health services, including mental health care. Given the pervasiveness of uninsurance among Hispanics in the United States, (DeNavas-Walt, 2006) it is important to facilitate access to safety-net mental health care providers by reducing administrative and economic barriers that may reduce the use of needed care by the most vulnerable populations. Additionally, it is essential that culturally diverse mental health providers are available to treat populations with diverse linguistic needs (e.g., Spanish-speakers, indigenous populations, etc).

One recent study (Ortega, 2006) identified that Puerto Ricans and Mexicans experiencing anxiety or depressive disorders were also likely to experience comorbid asthma and cardiovascular illness. Ortega and colleagues' analyses should be further expanded to the border region in order to shed light on the physical health-care needs of individuals experiencing comorbid mental illness.

The examination of illicit substance use and corresponding use of substance use treatment services revealed important differences in lifetime substance use by ethnicity and nativity. Significantly, Hispanics were less likely to report any lifetime use of illicit substances, though there were few prior-year differences; immigrant Hispanics in particular were least likely to have used illicit substances during their lives. In contrast, U.S.-born Hispanics and non-Hispanics exhibited similar lifetime and 12-month patterns of illicit substance use. Research literature suggests that sociocultural factors (e.g., family cohesion, attitudes towards drugs, abstention by siblings and parents; Grant, 2004; Hawkins, 1992) play an important role in shaping drug behaviors. However, greater access to drugs and increased peer pressure for engaging in risky behaviors also influence youths' and young adults' consumption of illicit drugs. The mere presence or absence of any of these factors will not predict substance use behaviors immediately or during the course of their lives. Therefore, additional efforts are needed to elucidate the protective mechanisms that result in immigrants' lower drug use prior to and following migration to the United States.

With respect to substance use treatment services, the data demonstrated that service use was low regardless of region, ethnicity, or nativity. For example, less than 10 percent of adults had ever used services and less than 5 percent had used services in the prior year, nationally and in the border region. The prevalence of substance use treatment services was lower for Hispanics compared to non-Hispanics, while immigrants in both ethnic groups fared similarly. While not all individuals may need to access professional substance use treatment services, it is important that those who need attention receive it in a timely, efficient, and affordable manner.

The data provided in this chapter provide a first view of the mental health needs of Hispanics, including immigrants, in the United States and its four-state U.S.-Mexico border-region. The data suggest that policy and health system factors may contribute to improved access to mental health and substance use treatment services by populations especially in the border region.

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CONCLUSION

As the data in this report clearly show, challenges to improving health in the U.S.-Mexico border region are numerous and complex. A highly urbanized population – more than 90 percent of border residents live in urban areas – lives next to rural and frontier communities, separated by long stretches of rural, desert landscapes and open spaces. Two critical factors affecting health status – overall levels of poverty and unemployment – are very high in the border area. Yet the homicide rate in U.S. border counties is substantially below the national level, and violent crime reports for the four U.S. border states mirror the national decline in violent crime since 1990 (Bureau of Justice Statistics, 2007). Environmental hazards, including high levels of atmospheric ozone and particulate matter, have been linked to the rapid rise in asthma cases among border inhabitants. The daily mixing of large numbers of U.S. and Mexican residents has been linked with high levels of communicable diseases in the border region. Yet for many communicable diseases, incidence rates in the border counties are lower than in the non-border areas of the four states and lower than national levels.

The border region is sorely lacking in health facilities and health workforce, and many border residents suffer from poor access to health care. Border residents have high levels of obesity and diabetes, among other health problems. Nevertheless, the border population does surprisingly well on many health measures including infant mortality, overall mortality, and deaths from two of the nation's leading causes, heart disease and cancer. Hispanics, the border residents who suffer the most from poverty and poor access to care, do nearly as well, and in some cases do better, than their non-Hispanic neighbors on many health measures.

Burgeoning population growth in the border region has increased the demand for both preventive and clinical health services. Population growth and increased cross-border traffic also call for increased epidemiological tracking and surveillance of infectious diseases, environmental health hazards, and chronic diseases. At the same time, government expenditures dedicated to public health are not keeping pace with population growth, and public health—the essential pillar of economic growth and prosperity—is at risk of reversing the positive gains for the last two decades.

In this complex landscape of people, places, cultures, and economic factors, many public and private agencies are working to address border health problems. These agencies include federal, state, and local government agencies, academic institutions, private and non-profit health-services providers, non-governmental advocacy organizations, and transnational institutions.

As pointed out in several chapters of this report, efforts to improve health in the border region are limited by lack of adequate systems for gathering and analyzing comparable data. While state and federal agencies maintain sizeable databases concerning demographics, morbidity and mortality, and other vital statistics, data are rarely germane to the sub-county level. Only in rare cases are data geo-coded by zip code, census tract, or geo-referenced coordinates. Very few health indicator databases for border populations are stratified by socioeconomic, cultural, or ethnic characteristics. This limitation makes it difficult to assess health conditions by particular cohorts. In other words, we do not really know our border population. While certain research projects do stratify such populations, studies are usually limited to a particular community or county that may not be representative of other areas along the border. Obtaining data from and among different federal, state, or county health authorities can be difficult for different reasons. Some cite privacy concerns, while others worry about the quality of the data. Also, the frequency for entering and updating data files differs for many of these authorities, with two or more years of data pending processing at any one time. As a result, the datasets that are available are not routinely used effectively to target public health expenditures in the geographic areas or demographic sectors of greatest need.

This inaugural Border Health Status Report indicates that there are continuing and serious health disparities among residents of the U.S. side of the U.S.-Mexico border. Nonetheless, the collective of health authorities and organizations along the border is vibrant, capable, and dedicated. It is likely that such efforts are linked to many of the positive health outcomes identified in this report, including unexpectedly positive birth outcomes, low rates of some infectious diseases, and lower rates of breast cancer in the border region.

This report should be used as a tool for focusing border health efforts, such as in the following areas:

- Utilizing the Healthy Border 2010 framework and the forthcoming Healthy

Border 2020 report under development as the basis for the development of plans and actions focused on particular border health issues.

- Improving interstate and binational communication among state health authorities and local medical service providers to facilitate better management of binational disease cases (for example, tuberculosis and sexually transmitted diseases), including improvement of the efficiency of intrastate and binational procedures for reporting of infectious diseases.
- Gearing research and evaluation frameworks to improving health systems at the local, state, and federal levels, with emphasis on providing access to care and reducing health disparities. Monitoring and evaluation frameworks should be based on an epidemiological information platform that uses geo-coding to permit analysis of health conditions at the sub-county level. Such a platform would provide a foundation for improved targeting of public health resources. Baselines should be established considering stratified demographic cohorts among different segments of the border population based on socio-cultural, ethnic, and economic parameters. Data should be made available to all legitimate users in the public and private sector for research, planning, monitoring, and evaluation.
- Synthesizing, analyzing, and making data publicly available on a regular basis through the production of periodic reports on the impact of border health activities.

The United States-Mexico Border Health Commission (BHC) will seek to publish periodic border health status updates similar to this first report. Future publications will include emerging issues impacting border residents such as adolescent health, environmental and occupational health, and elderly health care issues, among others. The BHC welcomes input on topics, issues, and actions from all border health stakeholders.

APPENDICES

APPENDIX TO CHAPTER 3

Methodology

The NHIS is a household multistage[1] probability sample interview that is conducted continuously throughout the year on behalf of the National Center for Health Statistics[2] through a contract with interviewers from the U.S. Census Bureau. The NHIS is conducted through a face-to-face interview survey protocol that relies on self-report and proxy report status. Therefore, the answer to each survey question relies on the best recall effort of the survey participant on a specific topic. The main goal of the NHIS is to monitor the health of the U.S. population through the collection and analysis of data on a broad range of health topics.

The target population for the NHIS is the civilian non-institutionalized population in the United States. Individuals excluded from the survey are patients in long-term care institutions (e.g. nursing homes, hospitals for the chronically ill, disabled, or wards for abused or neglected children); correctional facilities (e.g. prisons, jails, juvenile detention centers, halfway houses); active duty Armed Forces personnel, and U.S. nationals living in foreign countries. The NHIS has been used extensively in the past to estimate health insurance coverage status, self-reported health outcomes, and self-reported health care utilization (IOM 1993, Cohen 2004, Seid 2003). The NHIS has a well-documented low non-response rate (about one percent) for the insurance section, which greatly minimized the need to use techniques to compensate for missing data.

Because published health insurance estimates from the NHIS are limited to national, regional, or state levels[3], we used the in-house version of the NHIS

1 For an explanation of the multistage concept, see Richard M Single (2000), "52,467 + 57,204 = 254,281,227? Using the National Health Interview Survey and the 2000 Census to Introduce Statistical Sampling and Weights." *Journal of Statistics Education* 8(1). Retrieved from http://www.amstat.org/publications/jse/secure/v8n1/single.cfm

2 For more technical information concerning NHIS, visit the NHIS website at www.cdc.gov/nchs/nhis.htm.

3 In 2001, the Census Bureau released 2000 insurance coverage estimates at the county level. But such estimates are neither stratified by ethnicity nor contain any other self-reported health care variable of

to generate point estimates for a specific geographical region such as the U.S.-Mexico border[4]. To identify the counties that belong to the U.S.-Mexico border and the primary sampling unit (PSU) that the NHIS used to represent them, we first identified the federal information processing standard (FIPS) code[5] for each county. The same steps were taken to identify the PSU that represent the non-border counties and the border states. Subsequently, PSUs representing border counties were merged to develop a mutually-exclusive epidemiological unit.

Rate Calculation

Because NHIS data come from a complex multistage sample survey, statistics presented in this study are subject to sampling error. To compensate for this, standard errors adjusted for the complex sample frame are also reported to indicate the reliability of the estimates performed. Estimates and standard errors were calculated using the SPSS 13.0 complex sample module (SPSS). The SPSS complex sample module allows the computation of point estimates while taking into consideration the complexity of the survey design and weight assignment. The Taylor series linearization method was chosen for variance estimation.

Estimates were calculated by using in-house NHIS survey weights, which are calibrated to census totals for age, sex, race/ethnicity of the U.S. civilian non-institutionalized population. One caveat to this approach is that the weight used for the development of this report accurately reflects the national configuration, but may not expressly address the border age structure. To compensate for this, and to investigate the difference between standard error estimations for the United States and the border, a specific area re-weighting research project is underway at the NCHS.

The statistics provided in this report are based on data from the NHIS adult sample and family core components. For statistical purposes, each section was weighted according to its source file (e.g. the family core weight was specifically used for the questions belonging to the family core section).

Estimates presented in this report are adjusted percentages and their corresponding standard errors. Estimates presented have a relative standard error (RSE) of 30 percent or less. Cohen and Bloom have shown that estimates with such properties at the NHIS are statistically reliable. Estimates that do not comply with this requirement are identified as not statistically reliable and flagged with an asterisk (*).

interest. For more information, visit the Census Bureau website at www.census.gov/hhes/www/sahie/.

4 Results of this work can be replicated using the in-house NHIS.

5 FIPS codes are a standardized set of numeric or alphabetic codes issued by the National Institute of Standards and Technology (NIST) to ensure uniform identification of geographic entities through all federal government agencies. The entities covered include: states and statistically equivalent entities, counties and statistically equivalent entities, named populated and related location entities such as places and county subdivisions, and American Indian and Alaska Native areas.

Statistical tests for measuring significance of difference between two point estimates were performed using a two-tail Z test at the 0.05 level, assuming independence. For multiple comparisons, statistical significance was assessed by judging the overlap of 95 percent confidence intervals for calculated rates. The use of terms such as "greater than," more likely than," or "less likely than" indicates a statistically significant difference. The use of terms such as "no difference" or "equivalent rates" indicates that the estimates being compared were not statistically different. Overlapping confidence intervals represent a non-statistically significant relationship. Lack of comments regarding the difference between two estimates does not necessarily imply that the difference was tested and found to be not significant.

U.S.-Mexico Border

For 2000-2003, a group of 5,139 subjects from the adult population (18 years of age and older) of the U.S.-Mexico border region was identified. The Cluster selected corresponds to the number of individuals who also completed the adult and family components of the NHIS. More than half of the border population (53 percent) was identified as Hispanic. The majority of the individuals were females (56 percent). Three out of every four individuals were between 25 and 69 years of age.

The border region consists of counties within the 100 kilometer area north of the U.S.-Mexico border. The border counties include the 44 counties designated by the U.S.-Mexico Border Health Commission, plus Maricopa County, Arizona.

List of Tables

Table 1. Percent of the total population without health insurance coverage[1] by selected characteristics: 2000-2003

Region	Percent	Standard Error	Confidence Interval
United States	14.7	0.15	14.4-15.0
Border States[2]	20.6	0.37	19.9-21.3
Border Counties[3]	22.9	0.96	21.0-24.8
Non-Border Counties[4]	20.1	0.39	19.3-20.9
Region by Ethnicity[5]			
United States			
Hispanic	32.7	0.47	31.80-33.63
Non-Hispanic	12.0	0.14	11.75-12.29
Border States			
Hispanic	33.4	0.61	32.22-34.65
Non-Hispanic	13.2	0.34	12.50-13.87
Border Counties			
Hispanic	38.2	1.33	33.54-40.85
Non-Hispanic	12.0	1.11	9.96-14.39
Non-Border Counties			
Hispanic	32.3	0.69	30.94-33.71
Non-Hispanic	13.4	0.34	12.72-14.09

Footnotes:

[1] A person was defined as "uninsured" if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, state-sponsored or other government sponsored health program, or military plan at the time of the interview. This classification also includes individuals who have only Indian Health Services coverage or hand only a private plan that paid for one type of service such as accidents or dental care.
[2] Border states: Arizona, California, New Mexico, and Texas.
[3] Counties that are within 100 kilometers (62 miles) of US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region. **This includes 44 border counties identified by US-Mexico Border Health Commission, plus Maricopa County, Arizona.**
[4] Counties that belong to the 4 border states that are more than 100 kilometers (62 miles) of the US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region, **except Maricopa County, Arizona.**[5] Person of Hispanic or Latino origins may be of any race or combination of races. Similarly, the category "Non-Hispanics or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.

Data source: National Health Interview Survey, 2000-2003 (In-house version)

Table 2. Percent of the total uninsured[1] population: Short[2] and Long[3] term lack of health insurance cover age by selected characteristics: 2000-2003

Region	Percent	Standard Error	Confidence Interval
United States			
Short term	27.2	0.34	26.6-27.9
Long term	72.8	0.34	72.1-73.4
Border States[4]			
Short term	21.4	0.58	20.2-22.5
Long term	78.6	0.58	77.5-79.8
Border Counties[5]			
Short term	17.9	1.65	14.9-21.4
Long term	82.1	1.65	78.6-85.1
Non-Border Counties[6]			
Short term	22.2	0.60	21.0-23.4
Long term	77.8	0.60	76.6-79.0
Region by Ethnicity[7]			
United States			
Hispanic			
Short Term	17.6	0.48	16.6-18.5
Long Term	82.5	0.48	81.4-83.3
Non-Hispanic			
Short Term	31.6	0.40	30.7-32.3
Long Term	68.5	0.40	67.6-69.2
Border States			
Hispanic			
Short Term	16.6	0.60	15.4-17.8
Long Term	83.4	0.60	82.1-84.5
Non-Hispanic			
Short Term	29.4	0.97	27.4-31.3
Long Term	70.6	0.97	68.6-72.5
Border Counties			
Hispanic			
Short Term	13.1	1.23	10.8-15.7
Long Term	86.9	1.23	84.2-89.2
Non-Hispanic			
Short Term	31.4	3.60	24.7-39.0
Long Term	68.6	3.60	60.9-75.2
Non-Border Counties			
Hispanic			
Short Term	17.6	0.68	16.2-18.9
Long Term	82.4	0.68	81.0-83.7
Non-Hispanic			
Short Term	29.1	0.98	27.1-31.0
Long Term	70.9	0.98	68.9-72.8

* Estimates have a relative standard error of greater than 30 and should be used with caution as they do not meet the standards of reliability or precision.

Footnotes:

[1] A person was defined "uninsured" if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, state-sponsored or other government sponsored health program, or military plan at the time of the interview.
[2] Short Term Lack of Health Insurance- Less than 1 year without health insurance. A year was defined as the 12 months prior of the interview.
[3] Long Term Lack of Health Insurance- More than 1 year without health insurance.
[4] Border states: Arizona, California, New Mexico, and Texas.
[5] Border counties that are within 100 kilometers (62 miles) of US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region. This includes 44 border counties identified by US-Mexico Border Health Commission, plus Maricopa County, Arizona.
[6] Counties that belong to the 4 border states that are more than 100 kilometers (62 miles) of the US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border, except Maricopa County, Arizona as the US portion of the US-Mexico border region.
[7]Person of Hispanic or Latino origins may be of any race or combination of races. Similarly, the category "Non-Hispanics or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.

Data source: National Health Interview Survey, 2000-2004 (In-house version)

Table 3. Percent of the adult population (18 years and over) who did not get medical care because they can not afford it[1] by selected characteristics: 2000-2003

Region	Percent	Standard Error	Confidence Interval
United States	4.8	0.06	4.6-4.9
Border States[2]	4.7	0.13	4.5-5.0
Border Counties[3]	5.0	0.27	4.4-5.5
Non-Border Counties[4]	4.7	0.14	4.4-4.9
Region by Ethnicity[5]			
United States			
Hispanic	5.4	0.13	5.1-5.6
Non-Hispanic	4.7	0.06	4.5-4.8
Border States			
Hispanic	5.2	0.17	4.8-5.5
Non-Hispanic	4.5	0.15	4.1-4.7
Border Counties			
Hispanic	6.0	0.35	5.3-6.7
Non-Hispanic	4.3	0.33	3.6-4.9
Non-Border Counties			
Hispanic	5.0	0.2	4.6-5.4
Non-Hispanic	4.5	0.17	4.1-4.8
Region by Ethnicity and Insurance Coverage Status [6,7]			
United States			
Hispanic			
Insured	2.7	0.10	2.5-2.8
Uninsured	11.2	0.31	10.5-11.7
Non-Hispanic			
Insured	2.7	0.05	2.5-2.7
Uninsured	19.8	0.32	19.1-20.4
Border States			
Hispanic			
Insured	2.6	0.13	2.3-2.8
Uninsured	10.3	0.37	9.6-11.1
Non-Hispanic			
Insured	2.4	0.12	2.1-2.6
Uninsured	18.3	0.57	17.1-19.4
Border Counties			
Hispanic			
Insured	2.7	0.17	2.4-3.1
Uninsured	11.3	0.70	9.9-12.7
Non-Hispanic			
Insured	2.4	0.22	1.9-2.8
Uninsured	18.4	1.82	15.0-22.2
Non-Border Counties			
Hispanic			
Insured	2.6	0.15	2.3-2.9
Uninsured	10.1	0.44	9.2-10.9
Non-Hispanic			
Insured	2.4	0.13	2.1-2.7
Uninsured	18.2	0.60	17.0-19.4

* Estimates have a relative standard error of greater than 30 and should be used with caution as they do not meet the standards of reliability or precision.

Footnotes:

[1]Question: DURING THE PAST 12 MONTHS, was there any time when{person} needed medical care, but did not get it because {person} couldn't afford it?
[2] Border states: Arizona, California, New Mexico, and Texas.
[3] Border counties that are within 100 kilometers (62 miles) of US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region. This includes 44 border counties identified by US-Mexico Border Health Commission, plus Maricopa County, Arizona.
[4] Counties that belong to the 4 border states that are more than 100 kilometers (62 miles) of the US-Mexico border, defined under La Paz agreement (1987).
[5] Person of Hispanic or Latino origins may be of any race or combination of races. Similarly, the category "Non-Hispanics or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.
[6] A person was defined as "uninsured" if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, state-sponsored or other government sponsored health program, or military plan at the time of the interview. This classification also includes individuals who have only Indian Health Services coverage or hand only a private plan that paid for one type of service such as accidents or dental care.
[7] Without insurance coverage at the time of the interview.

Data source: National Health Interview Survey, 2000-2004 (In-house version)

Table 4. Percent of the adult population (18 years and over) who could not afford dental care in the past 12 months[1] by selected characteristics: 2000-2003

Region	Percent	Standard Error	Confidence Interval
United States	9.4	0.13	9.2-9.7
Border States[2]	10.4	0.27	9.9-10.9
Border Counties[3]	11.5	0.61	10.3-12.8
Non-Border Counties[4]	10.2	0.29	9.6-10.8
Region by Ethnicity			
United States			
Hispanic[5]	11.5	0.31	10.8-12.0
Non-Hispanic	9.2	0.14	8.9-9.4
Border States[2]			
Hispanic	12.3	0.48	11.4-13.3
Non-Hispanic	9.4	0.34	8.7-10.1
Border Counties[3]			
Hispanic	16.8	0.99	14.9-18.8
Non-Hispanic	8.1	0.86	6.5-9.9
Non-Border Counties[4]			
Hispanic	11.2	0.54	10.1-12.2
Non-Hispanic	9.7	0.36	8.9-10.4
Region by Ethnicity and Insurance Coverage Status [6,7]			
United States			
Hispanic			
Insured	7.0	0.28	6.5-7.6
Uninsured	18.7	0.60	17.5-19.9
Non-Hispanic			
Insured	6.3	0.11	6.0-6.5
Uninsured	29.3	0.51	28.2-30.3
Border States			
Hispanic			
Insured	7.7	0.44	6.8-8.6
Uninsured	19.7	0.80	18.1-21.3
Non-Hispanic			
Insured	6.2	0.29	5.6-6.8
Uninsured	30.3	1.26	27.8-32.9
Border Counties			
Hispanic			
Insured	8.5	1.05	6.6-10.8
Uninsured	27.0	1.98	23.2-31.0
Non-Hispanic			
Insured	6.0	0.83	4.4-7.8
Uninsured	25.5	2.18	21.4-30.0
Non-Border Counties			
Hispanic			
Insured	7.5	0.48	6.6-8.5
Uninsured	17.4	0.85	15.7-19.1
Non-Hispanic			
Insured	6.3	0.30	5.7-6.9
Uninsured	31.1	1.40	28.3-33.9

* Estimates preceded by an asterisk have a relative standard error of greater than 30 and should be used with caution as they do not meet the standards of reliability or precision.

Footnotes:

[1] Question: DURING THE PAST 12 MONTHS, was there any time when you needed any of the following, but didn't get it because you couldn't afford it? ..... Dental care (including check-ups).
[2] Border states: Arizona, California, New Mexico, and Texas.
[3] Counties that are within 100 kilometers (62 miles) of US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region.This includes 44 border counties identified by US-Mexico Border Health Commission, plus Maricopa County, Arizona.
[4] Counties that belong to the 4 border states that are more than 100 kilometers (62 miles) of the US-Mexico Border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region, except Maricopa County, Arizona.
[5] Person of Hispanic or Latino origins may be of any race or combination of races. Similarly, the category "Non-Hispanics or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.
[6] A person was defined as "uninsured" if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, state-sponsored or other government sponsored health program, or military plan at the time of the interview. This classification also includes individuals who have only Indian Health Services coverage or hand only a private plan that paid for one type of service such as accidents or dental care.
[7] Without insurance coverage at the time of the interview.

Data source: National Health Interview Survey, 2000-2004 (In-house version)

Table 5. Percent of the adult population (18 years and over) who could not afford mental/care counsel for the past 12 months[1] by selected characteristics: 2000-2003

Region	Percent	Standard Error	Confidence Interval
United States	1.9	0.05	1.8-2.0
Border States[2]	2.1	0.11	1.9-2.3
Border Counties[3]	2.7	0.32	2.1-3.4
Non-Border Counties[4]	2.0	0.12	1.8-2.2
Region by Ethnicity[5]			
United States			
Hispanic	2.3	0.14	2.0-2.5
Non-Hispanic	1.9	0.05	1.7-1.9
Border States			
Hispanic	2.5	0.2	2.1-2.9
Non-Hispanic	2.0	0.14	1.6-2.2
Border Counties			
Hispanic	4.2	0.61	3.1-5.5
Non-Hispanic	1.7	0.28	1.2-2.3
Non-Border Counties			
Hispanic	2.1	0.19	1.7-2.5
Non-Hispanic	2.0	0.15	1.7-2.3
Region by Ethnicity and Insurance Coverage Status[6,7]			
United States			
Hispanic			
Insured	1.1	0.11	0.9-1.3
Uninsured	4.2	0.29	3.6-4.8
Non-Hispanic			
Insured	1.2	0.04	1.1-1.2
Uninsured	6.6	0.26	6.1-7.1
Border States			
Hispanic			
Insured	1.1	0.15	0.8-1.4
Uninsured	4.7	0.39	4.0-5.5
Non-Hispanic			
Insured	1.2	0.11	0.9-1.4
Uninsured	7.0	0.72	5.7-8.5
Border Counties			
Hispanic			
Insured	1.3*	0.44	0.6-2.5
Uninsured	7.7	0.96	5.9-9.8
Non-Hispanic			
Insured	1.1*	0.23	0.7-1.6
Uninsured	6.5*	1.91	3.5-11.4
Non-Border Counties			
Hispanic			
Insured	1.1	0.15	0.8-1.4
Uninsured	3.8	0.39	3.0-4.6
Non-Hispanic			
Insured	1.2	0.12	0.9-1.4

* Estimates have a relative standard error of greater than 30 and should be used with caution as they do not meet the standards of reliability or precision.

Footnotes:

[1] DURING THE PAST 12 MONTHS, was there any time when you needed any of the following, but didn't get it because you couldn't afford it? ..... Mental health care or counseling.
[2] Border states: Arizona, California, New Mexico, and Texas.
[3] Counties that are within 100 kilometers (62 miles) of US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region. This includes 44 border counties identified by US-Mexico Border Health Commission, plus Maricopa County, Arizona.
[4] Counties that belong to the 4 border states that are more than 100 kilometers (62 miles) of the US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region, except Maricopa County, Arizona.
[5] Person of Hispanic or Latino origins may be of any race or combination of races. Similarly, the category "Non-Hispanics or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.
[6] A person was defined as "uninsured" if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, state-sponsored or other government sponsored health program, or military plan at the time of the interview. This classification also includes individuals who have only Indian Health Services coverage or hand only a private plan that paid for one type of service such as accidents or dental care.
[7] Without insurance coverage at the time of the interview.

Data source: National Health Interview Survey, 2000-2004 (In-house version)

Table 6. Percent of the adult population (18 years and over) who do not have a place to go when they are sick[1] by selected characteristics: 2000-2003

Region	Percent	Standard Error	Confidence Interval
United States	13.6	0.16	13.3-13.9
Border States[2]	18.2	0.40	17.4-18.9
Border Counties[3]	18.6	0.86	16.9-20.3
Non-Border Counties[4]	18.1	0.45	17.2-19.0
Region by Ethnicity[5]			
United States			
Hispanic	28.4	0.56	27-3-29.4
Non-Hispanic	11.8	0.15	11.4-12.0
Border States			
Hispanic	29.5	0.73	28.0-30.9
Non-Hispanic	12.5	0.38	11.7-13.3
Border Counties			
Hispanic	31.9	1.05	29.7-33.9
Non-Hispanic	10.0	0.89	8.4-11.9
Non-Border Counties			
Hispanic	28.8	0.89	27.0-30.6
Non-Hispanic	13.0	0.41	12.2-13.8
Region by Ethnicity and Insurance Coverage Status[6,7]			
United States			
Hispanic			
Insured	10.6	0.40	9.8-11.3
Uninsured	57.4	0.80	55.8-58.9
Non-Hispanic			
Insured	7.5	0.13	7.2-7.7
Uninsured	40.8	0.56	39.6-41.8
Border States			
Hispanic			
Insured	10.6	0.45	9.7-11.5
Uninsured	58.7	1.06	56.5-60.8
Non-Hispanic			
Insured	6.8	0.27	6.3-7.3
Uninsured	49.8	1.39	47.0-52.5
Border Counties			
Hispanic			
Insured	11.2	1.16	9.0-13.7
Uninsured	57.1	1.36	54.3-59.7
Non-Hispanic			
Insured	4.8	0.40	4.0-5.6
Uninsured	52.4	3.56	45.2-59.3
Non-Border Counties			
Hispanic			
Insured	10.5	0.49	9.5-11.5
Uninsured	59.2	1.33	56.5-61.8
Non-Hispanic			
Insured	7.2	0.31	6.6-7.8
Uninsured	49.4	1.51	46.4-52.4

* Estimates have a relative standard error of greater than 30 and should be used with caution as they do not meet the standards of reliability or precision.

Footnotes:

[1] Is there a place that you USUALLY go to when you are sick or need advice about your health (No responses)?
[2] Border states: Arizona, California, New Mexico, and Texas.
[3] Border counties that are within 100 kilometers (62 miles) of US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region. This includes 44 border counties identified by US-Mexico Border Health Commission, plus Maricopa County, Arizona.
[4] Counties that belong to the 4 border states that are more than 100 kilometers (62 miles) of the US-Mexico Border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region, except Maricopa County, Arizona.
[5] Person of Hispanic or Latino origins may be of any race or combination of races. Similarly, the category "Non-Hispanics or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.
[6] A person was defined as "uninsured" if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, state-sponsored or other government sponsored health program, or military plan at the time of the interview. This classification also includes individuals who have only Indian Health Services coverage or hand only a private plan that paid for one type of service such as accidents or dental care.
[7] Without insurance coverage at the time of the interview.

Data source: National Health Interview Survey, 2000-2004 (In-house version)

Table 7. Percent of the adult population (18 years and over) who have a place to go when they are sick[1] by selected characteristics: 2000-2003

Region	Percent	Standard Error	Confidence Interval
United States			
Clinic/Health Center	16.0	0.31	15.4-16.6
Dr. Office/HMO	79.7	0.33	79.0-80.3
Hospital ER/Outpatient Facility/Other Places	4.3	0.09	4.0-4.4
Border States[2]			
Clinic/Health Center	14.9	0.48	13.9-15.8
Dr. Office/HMO	80.7	0.56	79.6-81.6
Hospital ER/Outpatient Facility/Other Places	4.4	0.22	3.9-4.8
Border Counties[3]			
Clinic/Health Center	16.1	1.33	13.6-18.9
Dr. Office/HMO	79.8	1.36	76.9-82.3
Hospital ER/Outpatient Facility/Other Places	4.1	0.46	3.2-5.1
Non-Border Counties[4]			
Clinic/Health Center	14.6	0.49	13.6-15.5
Dr. Office/HMO	81.0	0.59	79.7-82.1
Hospital ER/Outpatient Facility/Other Places	4.5	0.25	3.9-5.0
Region by Ethnicity[5]			
United States			
Hispanic			
Clinic/Health Center	24.5	0.58	23.3-25.6
Dr. Office/HMO	68.2	0.64	66.6-69.4
Hospital ER/Outpatient Facility/Other Places	7.3	0.26	6.8-7.8
Non-Hispanic			
Clinic/Health Center	15.1	0.33	14.5-15.8
Dr. Office/HMO	80.9	0.35	80.2-81.6
Hospital ER/Outpatient Facility/Other Places	3.9	0.10	3.7-4.1
Border States			
Hispanic			
Clinic/Health Center	23.9	0.84	22.2-25.5
Dr. Office/HMO	70.1	0.93	68.1-71.8
Hospital ER/Outpatient Facility/Other Places	6.1	0.34	5.4-6.7
Non-Hispanic			
Clinic/Health Center	11.2	0.53	10.1-12.3
Dr. Office/HMO	85.1	0.61	83.8-86.2
Hospital ER/Outpatient Facility/Other Places	3.7	0.26	3.2-4.2
Border Counties			
Hispanic			
Clinic/Health Center	24.0	2.21	19.8-28.6
Dr. Office/HMO	70.3	2.41	65.3-74.8
Hospital ER/Outpatient Facility/Other Places	5.7	0.74	4.4-7.3
Non-Hispanic			
Clinic/Health Center	12.3	1.61	9.4-15.8
Dr. Office/HMO	84.4	1.63	80.8-87.3
Hospital ER/Outpatient Facility/Other Places	3.3	0.57	2.3-4.6
Non-Border Counties			
Hispanic			
Clinic/Health Center	23.9	0.89	22.1-25.6
Dr. Office/HMO	70.0	1.00	67.9-71.9
Hospital ER/Outpatient Facility/Other Places	6.1	0.38	5.4-6.9
Non-Hispanic			
Clinic/Health Center	11.0	0.52	9.9-12.0
Dr. Office/HMO	85.2	0.63	83.8-86.4
Hospital ER/Outpatient Facility/Other Places	3.8	0.29	3.2-4.4
Region by Ethnicity and Insurance Coverage Status [6,7]			
United States			
Hispanic			
Insured			
Clinic/Health Center	18.5	0.53	17.4-19.5
Dr. Office/HMO	77.0	0.58	75.8-78.1
Hospital ER/Outpatient Facility/Other Places	4.5	0.23	4.0-4.9

Table 7. Percent of the adult population (18 years and over) who have a place to go when they are sick by selected characteristics: 2000-2003 (Continued)

Region by Ethnicity and Insurance Coverage Status [6,7] Continued

Region	Percent	Standard Error	Confidence Interval
Uninsured			
Clinic/Health Center	45.2	1.29	42.6-47.7
Dr. Office/HMO	37.7	1.08	35.5-39.8
Hospital ER/Outpatient Facility/Other Places	17.2	0.85	15.5-18.8
Non-Hispanic			
Insured			
Clinic/Health Center	14.0	0.33	13.4-14.6
Dr. Office/HMO	83.0	0.34	82.2-83.6
Hospital ER/Outpatient Facility/Other Places	3.0	0.09	2.8-3.1
Uninsured			
Clinic/Health Center	26.8	0.79	25.3-28.4
Dr. Office/HMO	59.2	0.86	57.5-60.8
Hospital ER/Outpatient Facility/Other Places	14.0	0.53	12.9-15.0
Border States			
Hispanic			
Insured			
Clinic/Health Center	17.0	0.71	15.6-18.4
Dr. Office/HMO	79.3	0.8	77.6-80.8
Hospital ER/Outpatient Facility/Other Places	3.8	0.35	3.1-4.5
Uninsured			
Clinic/Health Center	46.9	1.78	43.4-50.4
Dr. Office/HMO	39.2	1.53	36.2-42.3
Hospital ER/Outpatient Facility/Other Places	13.8	0.97	12.0-15.8
Non-Hispanic			
Insured			
Clinic/Health Center	9.9	0.52	8.9-10.9
Dr. Office/HMO	87.3	0.61	86.0-88.4
Hospital ER/Outpatient Facility/Other Places	2.8	0.26	2.3-3.3
Uninsured			
Clinic/Health Center	26.6	1.79	23.2-30.3
Dr. Office/HMO	58.1	2.20	53.6-62.4
Hospital ER/Outpatient Facility/Other Places	15.3	1.42	12.6-18.3
Border Counties			
Hispanic			
Insured			
Clinic/Health Center	17.3	1.81	14.0-21.2
Dr. Office/HMO	79.8	1.95	75.6-83.3
Hospital ER/Outpatient Facility/Other Places	2.9	0.52	2.0-4.1
Uninsured			
Clinic/Health Center	40.9	3.48	34.1-47.9
Dr. Office/HMO	46.2	3.10	40.0-52.3
Hospital ER/Outpatient Facility/Other Places	12.9	1.67	9.9-16.6
Non-Hispanic			
Insured			
Clinic/Health Center	11.5	1.60	8.6-15.0
Dr. Office/HMO	86.4	1.60	82.8-89.2
Hospital ER/Outpatient Facility/Other Places	2.2	0.48	1.3-3.3
Uninsured			
Clinic/Health Center	25.0	4.98	16.4-36.1
Dr. Office/HMO	53.0	9.46	34.6-70.6
Hospital ER/Outpatient Facility/Other Places	22.0 *	6.47	11.7-37.4
Non-Border Counties			
Hispanic			
Insured			
Clinic/Health Center	16.9	0.78	15.4-18.5
Dr. Office/HMO	79.1	0.88	77.3-80.8
Hospital ER/Outpatient Facility/Other Places	4.0	0.41	3.2-4.8
Uninsured			
Clinic/Health Center	48.9	2.08	44.7-53.0
Dr. Office/HMO	37.0	1.77	33.5-40.5
Hospital ER/Outpatient Facility/Other Places	14.1	1.16	11.9-16.6
Non-Hispanic			
Insured			
Clinic/Health Center	9.6	0.52	8.5-10.6
Dr. Office/HMO	87.5	0.64	86.1-88.7
Hospital ER/Outpatient Facility/Other Places	2.9	0.29	2.3-3.5
Uninsured			
Clinic/Health Center	26.9	1.89	23.2-30.7
Dr. Office/HMO	58.8	2.14	54.5-63.0
Hospital ER/Outpatient Facility/Other Places	14.3	1.35	11.8-17.2

* Estimates have a relative standard error of greater than 30 and should be used with caution as they do not meet the standards of reliability or precision.

Footnotes:

[1] Question: What kind of place do you go to most often when (person) is sick?
[2] Border states: Arizona, California, New Mexico, and Texas.
[3] Border counties that are within 100 kilometers (62 miles) of US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region. This includes 44 border counties identified by US-Mexico Border Health Commission, plus Maricopa County, Arizona.
[4] Counties that belong to the 4 border states that are more than 100 kilometers (62 miles) of the US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region, except Maricopa County, Arizona.
[5] Person of Hispanic or Latino origins may be of any race or combination of races. Similarly, the category "Non-Hispanics or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.
[6] A person was defined as "uninsured" if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, state-sponsored or other government sponsored health program, or military plan at the time of the interview. This classification also includes individuals who have only Indian Health Services coverage or hand only a private plan that paid for one type of service such as accidents or dental care.
[7] Without insurance coverage at the time of the interview.

Data source: National Health Interview Survey, 2000-2004 (In-house version)

Table 8. Percent of the adult population (18 years and over) who have visited an emergency room in the past 12 months[1] by selected characteristics: 2000-2003

Region	Percent	Standard Error	Confidence Interval
United States	20.1	0.15	19.8-20.4
Border States[2]	17.8	0.34	17.1-18.4
Border Counties[3]	14.7	0.75	13.3-16.2
Non-Border Counties[4]	18.4	0.38	17.7-19.2
Region by Ethnicity[5]			
United States			
Hispanic	17.5	0.33	16.8-18.1
Non-Hispanic	20.4	0.16	20.0-20.7
Border States			
Hispanic	15.8	0.4	15.0-16.6
Non-Hispanic	18.7	0.45	17.8-19.6
Border Counties			
Hispanic	13.1	0.69	11.8-14.5
Non-Hispanic	15.7	0.98	13.8-17.7
Non-Border Counties			
Hispanic	16.5	0.46	15.6-17.4
Non-Hispanic	19.3	0.5	18.3-20.3
Region by Ethnicity and Insurance Coverage Status [6,7]			
United States			
Hispanic			
Insured	20.3	0.41	19.5-21.1
Uninsured	13.1	0.47	12.1-14.0
Non-Hispanic			
Insured	20.2	0.17	19.8-20.5
Uninsured	22.0	0.43	21.1-22.8
Border States			
Hispanic			
Insured	18.7	0.50	17.7-19.7
Uninsured	11.4	0.59	10.2-12.6
Non-Hispanic			
Insured	18.9	0.47	18.0-19.8
Uninsured	17.5	0.93	15.6-19.3
Border Counties			
Hispanic			
Insured	16.0	1.20	13.7-18.5
Uninsured	9.4	0.69	8.1-10.8
Non-Hispanic			
Insured	15.9	1.18	13.7-18.4
Uninsured	13.7	2.63	9.2-19.7
Non-Border Counties			
Hispanic			
Insured	19.3	0.54	18.2-20.4
Uninsured	12.0	0.72	10.6-13.5
Non-Hispanic			
Insured	19.5	0.51	18.5-20.5
Uninsured	18.1	1.01	16.1-20.1

* Estimates have a relative standard error of greater than 30 and should be used with caution as they do not meet the standards of reliability or precision.

Footnotes:

[1] DURING THE PAST 12 MONTHS, HOW MANY TIMES have you gone to a HOSPITAL EMERGENCY ROOM about your own health? (This includes emergency room visits that resulted in a hospital admission.)
[2] Border states: Arizona, California, New Mexico, and Texas.
[3] Border counties that are within 100 kilometers (62 miles) of US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region. This includes 44 border counties identified by US-Mexico Border Health Commission, plus Maricopa County, Arizona.
[4] Counties that belong to the 4 border states that are more than 100 kilometers (62 miles) of the US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region, except Maricopa County, Arizona.
[5] Person of Hispanic or Latino origins may be of any race or combination of races. Similarly, the category "Non-Hispanics or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.
[6] A person was defined as "uninsured" if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, state-sponsored or other government sponsored health program, or military plan at the time of the interview. This classification also includes individuals who have only Indian Health Services coverage or hand only a private plan that paid for one type of service such as accidents or dental care.
[7] Without insurance coverage at the time of the interview.

Data source: National Health Interview Survey, 2000-2004 (In-house version)

Table 9. Percent of the total population who spent at least one night in hospital in the past 12 months[1] by selected characteristics: 2000-2003

Region	Percent	Standard Error	Confidence Interval
United States	8.5	0.06	8.4-8.6
Border States[2]	7.6	0.12	7.3-7.8
Border Counties[3]	7.9	0.29	7.4-8.5
Non-Border Counties[4]	7.5	0.12	7.3-7.8
Region by Ethnicity[5]			
United States			
Hispanic	7.4	0.11	7.1-7.5
Non-Hispanic	8.7	0.07	8.5-8.8
Border States			
Hispanic	7.1	0.15	6.8-7.4
Non-Hispanic	7.8	0.15	7.5-8.1
Border Counties			
Hispanic	7.6	0.31	7.0-8.2
Non-Hispanic	8.2	0.32	7.5-8.8
Non-Border Counties			
Hispanic	7.0	0.17	6.6-7.3
Non-Hispanic	7.8	0.17	7.4-8.1
Region by Ethnicity and Insurance Coverage Status [6,7]			
United States			
Hispanic			
Insured	8.7	0.15	8.3-8.9
Uninsured	4.8	0.16	4.4-5.1
Non-Hispanic			
Insured	9.2	0.07	9.0-9.3
Uninsured	5.4	0.14	5.1-5.7
Border States			
Hispanic			
Insured	8.4	0.22	8.0-8.8
Uninsured	4.5	0.20	4.1-4.9
Non-Hispanic			
Insured	8.4	0.17	8.0-8.7
Uninsured	4.4	0.32	3.8-5.0
Border Counties			
Hispanic			
Insured	9.5	0.58	8.4-10.7
Uninsured	4.5	0.40	3.8-5.4
Non-Hispanic			
Insured	8.8	0.35	8.0-9.4
Uninsured	4.0	0.70	2.8-5.6
Non-Border Counties			
Hispanic			
Insured	8.2	0.23	7.7-8.6
Uninsured	4.5	0.23	4.0-4.9
Non-Hispanic			
Insured	8.3	0.18	7.9-8.6
Uninsured	4.5	0.35	3.8-5.2

* Estimates have a relative standard error of greater than 30 and should be used with caution as they do not meet the standards of reliability or precision.

Footnotes:

[1]DURING THE PAST 12 MONTHS was {person} a patient in a hospital OVERNIGHT? (Do not include an overnight stay in the emergency room.) Remember to include any new mothers and/or babies who where hospitalized for the baby's birth.
[2] Border states: Arizona, California, New Mexico, and Texas.
[3] Border counties that are within 100 kilometers (62 miles) of US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region. This includes 44 border counties identified by US-Mexico Border Health Commission, plus Maricopa County, Arizona.
[4] Counties that belong to the 4 border states that are more than 100 kilometers (62 miles) of the US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region, except Maricopa County, Arizona.
[5] Person of Hispanic or Latino origins may be of any race or combination of races. Similarly, the category "Non-Hispanics or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.
[6] A person was defined as "uninsured" if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, state-sponsored or other government sponsored health program, or military plan at the time of the interview. This classification also includes individuals who have only Indian Health Services coverage or hand only a private plan that paid for one type of service such as accidents or dental care.
[7] Without insurance coverage at the time of the interview.

Data source: National Health Interview Survey, 2000-2004 (In-house version)

Table 10. Percent of the adult population (18 years and over) who have seen/talked to a General Doctor in the past 12 months[1] by selected characteristics: 2000-2003

Region	Percent	Standard Error	Confidence Interval
United States	68.2	0.21	67.8-68.6
Border States[2]	63.4	0.47	62.4-64.3
Border Counties[3]	56.7	1.43	53.9-59.5
Non-Border Counties[4]	64.8	0.5	63.8-65.8
Region by Ethnicity[5]			
United States			
Hispanic	54.7	0.49	53.7-55.6
Non-Hispanic	69.9	0.22	69.4-70.3
Border States			
Hispanic	53.3	0.63	52.0-54.5
Non-Hispanic	68.5	0.51	67.4-69.4
Border Counties			
Hispanic	45.2	1.38	42.4-47.9
Non-Hispanic	64.2	1.64	60.8-67.3
Non-Border Counties			
Hispanic	55.4	0.71	54.0-56.8
Non-Hispanic	69.3	0.51	68.2-70.2
Region by Ethnicity and Insurance Coverage Status[6,7]			
United States			
Hispanic			
Insured	67.2	0.52	66.1-68.1
Uninsured	34.5	0.73	33.0-35.9
Non-Hispanic			
Insured	73.6	0.21	73.1-79.9
Uninsured	45.3	0.56	44.1-46.3
Border States			
Hispanic			
Insured	65.3	0.73	63.8-66.7
Uninsured	34.7	0.88	32.9-36.5
Non-Hispanic			
Insured	72.9	0.55	71.7-73.9
Uninsured	40.1	1.29	37.5-42.7
Border Counties			
Hispanic			
Insured	57.1	1.41	54.2-59.8
Uninsured	30.4	1.77	27.0-34.0
Non-Hispanic			
Insured	68.2	2.08	63.9-72.2
Uninsured	32.2	2.67	27.1-37.7
Non-Border Counties			
Hispanic			
Insured	67.2	0.82	65.5-68.8
Uninsured	36.1	1.01	34.1-38.1
Non-Hispanic			
Insured	73.8	0.52	72.7-74.8
Uninsured	41.4	1.40	38.6-44.2

* Estimates have a relative standard error of greater than 30 and should be used with caution as they do not meet the standards of reliability or precision.

Footnotes:

[1] DURING THE PAST 12 MONTHS, that is since {12 monthref date}, have you seen or talked to any of the following health care providers about your own health? ..... A general doctor who treats a variety of illnesses (a doctor in general practice, family medicine, or internal medicine)
[2] Border states: Arizona, California, New Mexico, and Texas.
[3] Border counties that are within 100 kilometers (62 miles) of US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region. This includes 44 border counties identified by US-Mexico Border Health Commission, plus Maricopa County, Arizona.
[4] Counties that belong to the 4 border states that are more than 100 kilometers (62 miles) of the US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region, except Maricopa County, Arizona.
[5] Person of Hispanic or Latino origins may be of any race or combination of races. Similarly, the category "Non-Hispanics or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.
[6] A person was defined as "uninsured" if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, state-sponsored or other government sponsored health program, or military plan at the time of the interview. This classification also includes individuals who have only Indian Health Services coverage or hand only a private plan that paid for one type of service such as accidents or dental care.
[7] Without insurance coverage at the time of the interview.

Data source: National Health Interview Survey, 2000-2004 (In-house version)

Table 11. Percent of the adult population (18 years and over) who have seen/talked to a Medical Specialist in the past 12 months[1] by selected characteristics: 2000-2003

Region	Percent	Standard Error	Confidence Interval
United States	25.7	0.18	25.3-26.0
Border States[2]	23.3	0.39	22.5-24.0
Border Counties[3]	19.9	0.93	18.2-21.8
Non-Border Counties[4]	24.0	0.43	23.1-24.8
Region by Ethnicity[5]			
United States			
Hispanic	15.1	0.33	14.4-15.7
Non-Hispanic	27.0	0.19	26.6-27.3
Border States			
Hispanic	14.1	0.41	13.2-14.9
Non-Hispanic	27.9	0.46	26.9-28.7
Border Counties			
Hispanic	11.7	0.56	10.6-12.9
Non-Hispanic	25.2	1.12	23.0-27.5
Non-Border Counties			
Hispanic	14.7	0.5	13.7-15.7
Non-Hispanic	28.4	0.5	27.4-29.3
Region by Ethnicity and Insurance Coverage Status [6,7]			
United States			
Hispanic			
Insured	20.3	0.45	19.4-21.2
Uninsured	6.6	0.34	6.0-7.3
Non-Hispanic			
Insured	29.3	0.20	28.8-29.6
Uninsured	11.9	0.34	11.2-12.5
Border States			
Hispanic			
Insured	19.0	0.56	19.9-20.1
Uninsured	6.4	0.51	5.4-7.5
Non-Hispanic			
Insured	30.3	0.49	29.3-31.2
Uninsured	12.5	1.04	10.5-14.6
Border Counties			
Hispanic			
Insured	17.2	0.87	15.5-18.9
Uninsured	5.0	0.78	3.6-6.7
Non-Hispanic			
Uninsured	11.9	1.99	8.4-16.4
Insured	26.7	1.21	24.6-29.4
Non-Border Counties			
Hispanic			
Insured	19.5	0.66	18.1-20.8
Uninsured	6.8	0.62	5.7-8.1
Non-Hispanic			
Insured	31.0	0.54	29.8-32.0
Uninsured	12.6	1.17	10.4-15.0

* Estimates have a relative standard error of greater than 30 and should be used with caution as they do not meet the standards of reliability or precision.

Footnotes:

[1] DURING THE PAST 12 MONTHS, that is since {12 monthref date}, have you seen or talked to any of the following health care providers about your own health? ..... A medical doctor who specializes in a particular medical disease or problem (other than obstetrician/gynecologist, psychiatrist orophthalmologist)?
[2] Border states: Arizona, California, New Mexico, and Texas.
[3] Border counties that are within 100 kilometers (62 miles) of US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region. This includes 44 border counties identified by US-Mexico Border Health Commission, plus Maricopa County, Arizona.
[4] Counties that belong to the 4 border states that are more than 100 kilometers (62 miles) of the US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region, except Maricopa County, Arizona.
[5] Person of Hispanic or Latino origins may be of any race or combination of races. Similarly, the category "Non-Hispanics or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.
[6] A person was defined as "uninsured" if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, state-sponsored or other government sponsored health program, or military plan at the time of the interview. This classification also includes individuals who have only Indian Health Services coverage or hand only a private plan that paid for one type of service such as accidents or dental care.
[7] Without insurance coverage at the time of the interview.

Data source: National Health Interview Survey, 2000-2004 (In-house version)

Table 12. Percent of the female adult population (18 years and over) who have seen/talked to a OB/GYN in the past 12 months[1] by selected characteristics: 2000-2003

Region	Percent	Standard Error	Confidence Interval
United States	45.6	0.28	45.1-46.2
Border States[2]	42.5	0.58	41.3-43.7
Border Counties[3]	40.8	1.52	37.8-43.9
Non-Border Counties[4]	42.9	0.62	41.6-44.1
Region by Ethnicity[5]			
United States			
Hispanic	43.9	0.65	42.6-45.2
Non-Hispanic	45.8	0.3	45.2-46.4
Border States			
Hispanic	39.8	0.9	38.0-41.6
Non-Hispanic	43.8	0.76	42.3-45.3
Border Counties			
Hispanic	35.1	1.26	32.6-37.6
Non-Hispanic	44.5	2.41	39.8-49.3
Non-Border Counties			
Hispanic	41.1	1.09	38.9-43.2
Non-Hispanic	43.7	0.79	42.14-45.2
Region by Ethnicity and Insurance Coverage Status [6,7]			
United States			
Hispanic			
Insured	50.1	0.79	48.5-51.6
Uninsured	32.2	1.03	30.2-34.2
Non-Hispanic			
Insured	47.4	0.32	46.7-48.0
Uninsured	34.3	0.69	32.9-35.6
Border States			
Hispanic			
Insured	45.7	1.09	43.5-47.8
Uninsured	29.9	1.19	27.5-32.3
Non-Hispanic			
Insured	45.5	0.90	43.7-47.2
Uninsured	31.8	1.72	28.4-35.2
Border Counties			
Hispanic			
Insured	40.7	1.57	37.5-43.8
Uninsured	27.5	1.81	24.0-31.2
Non-Hispanic			
Insured	45.2	2.78	39.6-50.7
Uninsured	38.9	5.95	27.8-51.1
Non-Border Counties			
Hispanic			
Insured	46.8	1.29	44.2-49.4
Uninsured	30.6	1.48	27.7-33.6
Non-Hispanic			
Insured	45.6	0.93	43.7-47.4
Uninsured	30.8	1.78	27.3-34.4

* Estimates have a relative standard error of greater than 30 and should be used with caution as they do not meet the standards of reliability or precision.

Footnotes:

[1] DURING THE PAST 12 MONTHS, that is since {12 monthref.date}, have you seen or talked to any of the following health care providers about your own health? ..... A doctor who specializes in women's health (an obstetrician/gynecologist)?
[2] Border states: Arizona, California, New Mexico, and Texas.
[3] Border counties that are within 100 kilometers (62 miles) of US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region. This includes 44 border counties identified by US-Mexico Border Health Commission, plus Maricopa County, Arizona.
[4] Counties that belong to the 4 border states that are more than 100 kilometers (62 miles) of the US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region, except Maricopa County, Arizona.
[5] Person of Hispanic or Latino origins may be of any race or combination of races. Similarly, the category "Non-Hispanics or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.
[6] A person was defined as "uninsured" if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, state-sponsored or other government sponsored health program, or military plan at the time of the interview. This classification also includes individuals who have only Indian Health Services coverage or hand only a private plan that paid for one type of service such as accidents or dental care.
[7] Without insurance coverage at the time of the interview.

Data source: National Health Interview Survey, 2000-2004 (In-house version)

Table 13. Time since last saw/talked to a dentist[1] for respondents age 18 years and over by selected characteristics: 2000-2003

Region	Percent	Standard Error	Confidence Interval
United States			
6 months or less	46.4	0.24	45.9-46.8
More than 6 mo., but no more than a year ago	17.5	0.14	17.2-17.7
More than 1 year	36.2	0.23	35.7-36.6
Border States[2]			
6 months or less	43.1	0.55	42.0-44.2
More than 6 mo., but no more than a year ago	17.5	0.31	16.9-18.2
More than 1 year	39.4	0.5	38.4-40.4
Border Counties[3]			
6 months or less	43.9	1.26	41.4-46.4
More than 6 mo., but no more than a year ago	16.3	0.75	14.8-17.8
More than 1 year	39.8	1.34	37.2-42.5
Non-Border Counties[4]			
6 months or less	42.9	0.61	41.7-44.2
More than 6 mo., but no more than a year ago	17.8	0.34	17.1-18.5
More than 1 year	39.3	0.53	38.2-40.3
Region by Ethnicity			
United States			
Hispanic[5]			
6 months or less	33.4	0.51	32.4-34.3
More than 6 mo., but no more than a year ago	18.0	0.36	17.3-18.7
More than 1 year	48.6	0.5	47.6-49.6
Non-Hispanic			
6 months or less	47.9	0.26	47.4-48.4
More than 6 mo., but no more than a year ago	17.4	0.15	17.0-17.7
More than 1 year	34.7	0.24	34.2-35.1
4 Border States			
Hispanic			
6 months or less	31.7	0.72	30.2-33.1
More than 6 mo., but no more than a year ago	17.6	0.51	16.6-18.6
More than 1 year	50.7	0.69	49.3-52.1
Non-Hispanic			
6 months or less	48.6	0.6	47.4-49.8
More than 6 mo., but no more than a year ago	17.5	0.36	16.7-18.2
More than 1 year	33.9	0.58	32.7-35.0
Border Counties			
Hispanic			
6 months or less	28.8	1.62	25.7-32.1
More than 6 mo., but no more than a year ago	14.9	1.19	12.6-17.4
More than 1 year	56.2	1.43	53.5-59.0
Non-Hispanic			
6 months or less	53.2	1.71	49.7-56.5
More than 6 mo., but no more than a year ago	17.1	0.78	15.5-18.7
More than 1 year	29.8	1.71	26.4-33.2
Non-Border Counties			
Hispanic			
6 months or less	32.4	0.83	30.7-34.0
More than 6 mo., but no more than a year ago	18.3	0.56	17.2-19.4
More than 1 year	49.3	0.79	47.7-50.8
Non-Hispanic			
6 months or less	47.8	0.64	46.4-49.0
More than 6 mo., but no more than a year ago	17.6	0.39	16.7-18.3
More than 1 year	34.7	0.62	33.4-35.9
Region by Ethnicity and Insurance Coverage Status [6,7]			
United States			
Hispanic			
Insured			
6 months or less	41.3	0.59	40.1-42.5
More than 6 mo., but no more than a year ago	19.7	0.44	18.8-20.6
More than 1 year	39.0	0.53	38.0-40.0
Uninsured			
6 months or less	19.3	0.63	18.1-20.6

Table 13. Time since last saw/talked to a dentist[1] for respondents age 18 years and over by selected characteristics: 2000-2003 (Continued)

Region	Percent	Standard Error	Confidence Interval
More than 6 mo., but no more than a year ago	14.9	0.53	13.9-16.0
More than 1 year	65.8	0.77	64.3-67.3
Non-Hispanic			
Insured			
6 months or less	51.4	0.27	50.8-51.9
More than 6 mo., but no more than a year ago	17.5	0.17	17.2-17.9
More than 1 year	31.1	0.24	30.6-31.6
Uninsured			
6 months or less	24.2	0.45	23.3-25.0
More than 6 mo., but no more than a year ago	16.3	0.39	15.6-17.1
More than 1 year	59.5	0.51	58.5-60.5
4 Border States			
Hispanic			
Insured			
6 months or less	39.5	0.83	37.8-41.1
More than 6 mo., but no more than a year ago	19.5	0.64	18.2-20.8
More than 1 year	41.1	0.70	39.7-42.5
Uninsured			
6 months or less	18.9	0.87	17.2-20.7
More than 6 mo., but no more than a year ago	14.4	0.72	13.1-15.9
More than 1 year	66.7	1.02	64.6-68.7
Non-Hispanic			
Insured			
6 months or less	52.8	0.69	51.4-54.2
More than 6 mo., but no more than a year ago	17.4	0.40	16.6-18.2
More than 1 year	29.8	0.70	28.4-31.2
Uninsured			
6 months or less	21.0	1.04	19.0-23.2
More than 6 mo., but no more than a year ago	18.2	0.90	16.4-20.0
More than 1 year	60.8	1.05	58.7-62.9
Border Counties			
Hispanic			
Insured			
6 months or less	37.5	1.86	33.8-41.3
More than 6 mo., but no more than a year ago	17.4	1.66	14.3-21.0
More than 1 year	45.1	1.75	41.7-48.6
Uninsured			
6 months or less	17.4	2.10	13.6-22.0
More than 6 mo., but no more than a year ago	11.7	1.12	9.7-14.2
More than 1 year	70.8	2.13	66.4-74.9
Non-Hispanic			
Insured			
6 months or less	57.1	2.10	52.9-61.2
More than 6 mo., but no more than a year ago	17.4	1.01	15.5-19.6
More than 1 year	25.5	2.35	21.1-30.4
Uninsured			
6 months or less	21.5	3.02	16.1-28.1
More than 6 mo., but no more than a year ago	13.6	2.23	9.7-18.7
More than 1 year	64.9	2.34	60.1-69.4
Non-Border Counties			
Hispanic			
Insured			
6 months or less	39.9	0.96	38.0-41.8
More than 6 mo., but no more than a year ago	19.9	0.68	18.6-21.3
More than 1 year	40.2	0.79	38.6-41.7
Uninsured			
6 months or less	19.3	0.92	17.6-21.2
More than 6 mo., but no more than a year ago	15.3	0.86	13.6-17.1
More than 1 year	65.4	1.13	63.1-67.6
Non-Hispanic			
Insured			
6 months or less	52.0	0.72	50.5-53.4
More than 6 mo., but no more than a year ago	17.4	0.43	16.5-18.2
More than 1 year	30.7	0.69	29.3-32.1
Uninsured			
6 months or less	20.9	1.10	18.8-23.2
More than 6 mo., but no more than a year ago	18.9	0.97	17.0-20.9
More than 1 year	60.2	1.17	57.8-62.5

* Estimates have a relative standard error of greater than 30 and should be used with caution as they do not meet the standards of reliability or precision.

Footnotes:

[1] Question: About how long has it been since you last saw a dentist? Include all types of dentists, such as orthodontists, oral surgeons, and all other dental specialists, as well as dental hygienists.
[2] Border states: Arizona, California, New Mexico, and Texas.
[3] Counties that are within 100 kilometers (62 miles) of US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region. This includes 44 border counties identified by US-Mexico Border Health Commission, plus Maricopa County, Arizona.
[4] Counties that belong to the 4 border states that are more than 100 kilometers (62 miles) of the US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region, except Maricopa County, Arizona.
[5] Person of Hispanic or Latino origins may be of any race or combination of races. Similarly, the category "Non-Hispanics or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.
[6] A person was defined as "uninsured" if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, state-sponsored or other government sponsored health program, or military plan at the time of the interview. This classification also includes individuals who have only Indian Health Services coverage or hand only a private plan that paid for one type of service such as accidents or dental care.
[7] Without insurance coverage at the time of the interview.

Data source: National Health Interview Survey, 2000-2004 (In-house version)

Table 14. Percent of the adult population (18 years and over) who have seen/talked with a mental health professional in the past 12 months[1] by selected characteristics: 2000-2003

Region	Percent	Standard Error	Confidence Interval
United States	6.2	0.08	6.0-6.3
Border States[2]	5.5	0.17	5.1-5.8
Border Counties[3]	4.7	0.37	4.0-5.5
Non-Border Counties[4]	5.6	0.19	5.3-6.0
Region by Ethnicity[5]			
United States			
Hispanic	3.8	0.16	3.5-4.1
Non-Hispanic	6.5	0.09	6.2-6.6
Border States			
Hispanic	3.0	0.17	2.7-3.4
Non-Hispanic	6.7	0.23	6.2-7.1
Border Counties			
Hispanic	2.7	0.53	1.7-3.9
Non-Hispanic	6.0	0.59	4.8-7.2
Non-Border Counties			
Hispanic	3.1	0.17	2.8-3.5
Non-Hispanic	6.8	0.25	6.3-7.3
Region by Ethnicity and Insurance Coverage Status [6,7]			
United States			
Hispanic			
Insured	5.3	0.23	4.9-5.7
Uninsured	1.4	0.15	1.1-1.7
Non-Hispanic			
Insured	6.5	0.10	6.3-6.7
Uninsured	5.8	0.23	5.3-6.2
Border States			
Hispanic			
Insured	4.3	0.26	3.7-4.8
Uninsured	1.1	0.19	.79-1.5
Non-Hispanic			
Insured	6.8	0.24	6.3-7.3
Uninsured	5.7	0.54	4.6-6.8
Border Counties			
Hispanic			
Insured	3.8	0.76	2.5-5.6
Uninsured	1.1*	0.49	0.4-2.6
Non-Hispanic			
Insured	5.9	0.59	4.7-7.1
Uninsured	6.8	1.34	1.3-4.5
Non-Border Counties			
Hispanic			
Insured	4.4	0.26	3.8-4.9
Uninsured	1.1	0.20	0.7-1.5
Non-Hispanic			
Insured	7.0	0.26	6.5-7.5
Uninsured	5.5	0.59	4.4-6.7

* Estimates have a relative standard error of greater than 30 and should be used with caution as they do not meet the standards of reliability or precision.

Footnotes:

[1] DURING THE PAST 12 MONTHS, that is since {12 monthref. date}, have you seen or talked to any of the following health care providers about your own health? ..... A mental health professional such as a psychiatrist, psychologist, psychiatric nurse, or clinical social worker.
[2] Border states: Arizona, California, New Mexico, and Texas.
[3] Counties that are within 100 kilometers (62 miles) of US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region. This includes 44 border counties identified by US-Mexico Border Health Commission, plus Maricopa County, Arizona.
[4] Counties that belong to the 4 border states that are more than 100 kilometers (62 miles) of the US-Mexico Border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region, except Maricopa County, Arizona.
[5] Person of Hispanic or Latino origins may be of any race or combination of races. Similarly, the category "Non-Hispanics or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.
[6] A person was defined as "uninsured" if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, state-sponsored or other government sponsored health program, or military plan at the time of the interview. This classification also includes individuals who have only Indian Health Services coverage or hand only a private plan that paid for one type of service such as accidents or dental care.
[7] Without insurance coverage at the time of the interview.

Data source: National Health Interview Survey, 2000-2004 (In-house version)

Table 15. Percent of the adult population (18 years and over) who have received a flu shot in the past 12 months[1] by selected characteristics: 2000-2003

Region	Percent	Standard Error	Confidence Interval
United States	27.9	0.19	27.5-28.3
Border States[2]	24.8	0.44	23.9-25.7
Border Counties[3]	24.2	1.31	21.7-26.9
Non-Border Counties[4]	24.9	0.45	24.0-25.8
Region by Ethnicity[5]			
United States			
Hispanic	17.4	0.38	16.7-18.2
Non-Hispanic	29.2	0.21	28.8-29.6
Border States			
Hispanic	17.1	0.46	16.1-17.9
Non-Hispanic	28.7	0.59	27.5-29.8
Border Counties			
Hispanic	16.5	0.81	14.9-18.1
Non-Hispanic	29.2	1.95	25.4-33.2
Non-Border Counties			
Hispanic	17.2	0.54	16.1-18.2
Non-Hispanic	28.6	0.59	27.4-29.7
Region by Ethnicity and Insurance Coverage Status [6,7]			
United States			
Hispanic			
Insured	23.0	0.53	21.9-24.0
Uninsured	8.3	0.36	7.6-9.0
Non-Hispanic			
Insured	31.8	0.22	31.4-32.2
Uninsured	11.6	0.32	10.9-12.2
Border States			
Hispanic			
Insured	22.8	0.67	21.5-24.2
Uninsured	8.0	0.44	7.14-8.8
Non-Hispanic			
Insured	31.3	0.62	30.0-32.5
Uninsured	11.9	0.85	10.3-13.7
Border Counties			
Hispanic			
Insured	23.6	1.31	21.0-26.2
Uninsured	7.7	0.63	6.5-9.0
Non-Hispanic			
Insured	31.6	1.93	27.8-35.5
Uninsured	10.9	2.36	7.0-16.5
Non-Border Counties			
Hispanic			
Insured	22.7	0.77	21.1-24.2
Uninsured	8.0	0.54	7.0-9.1

* Estimates have a relative standard error of greater than 30 and should be used with caution as they do not meet the standards of reliability or precision.

Footnotes:

[1] DURING THE PAST 12 MONTHS, have you had a flu vaccine sprayed in your nose by a doctor or other health professional? A health professional may have let you spray it. This vaccine is usually given in the fall and protects against influenza for the flu season. [This influenza vaccine is called FluMist.]
[2] Border states: Arizona, California, New Mexico, and Texas.
[3] Counties that are within 100 kilometers (62 miles) of US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region. This includes 44 border counties identified by US-Mexico Border Health Commission, plus Maricopa County, Arizona.
[4] Counties that belong to the 4 border states that are more than 100 kilometers (62 miles) of the US-Mexico Border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region, except Maricopa County, Arizona.
[5] Person of Hispanic or Latino origins may be of any race or combination of races. Similarly, the category "Non-Hispanics or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.
[6] A person was defined as "uninsured" if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, State-sponsored or other government sponsored health program, or military plan at the time of the interview. This classification also includes individuals who have only Indian Health Services coverage or hand only a private plan that paid for one type of service such as accidents or dental care.
[7] Without insurance coverage at the time of the interview.

Data source: National Health Interview Survey, 2000-2004 (In-house version)

Table 16. Percent of the adult population (18 years and over) who have received a pneumonia shot in the past 12 months[1] by selected characteristics: 2000-2003

Region	Percent	Standard Error	Confidence Interval
United States	15.6	0.16	15.3-16.0
Border States[2]	13.8	0.45	12.9-14.7
Border Counties[3]	14.9	1.73	11.8-18.7
Non-Border Counties[4]	13.5	0.38	12.8-14.3
Region by Ethnicity			
United States			
Hispanic[5]	7.2	0.27	6.6-7.6
Non-Hispanic	16.7	0.18	16.3-17.0
Border States			
Hispanic	6.9	0.35	6.2-7.6
Non-Hispanic	17.2	0.6	16.0-18.4
Border Counties			
Hispanic	6.2	0.71	4.9-7.7
Non-Hispanic	20.6	2.57	15.9-26.2
Non-Border Counties			
Hispanic	7.1	0.39	6.4-7.9
Non-Hispanic	16.6	0.49	15.6-17.5
Region by Ethnicity and Insurance Coverage Status [6,7]			
United States			
Hispanic			
Insured	9.4	0.38	8.6-10.1
Uninsured	3.6	0.25	3.1-4.0
Non-Hispanic			
Insured	18.2	0.19	17.8-18.5
Uninsured	6.8	0.27	6.3-7.4
Border States			
Hispanic			
Insured	9.6	0.54	8.6-10.7
Uninsured	2.8	0.28	2.2-3.3
Non-Hispanic			
Insured	19.1	0.66	17.1-20.4
Uninsured	5.7	0.65	4.4-7.0
Border Counties			
Hispanic			
Insured	9.1	1.15	7.0-11.6
Uninsured	2.5	0.57	1.5-3.9
Non-Hispanic			
Insured	22.6	2.65	17.7-28.3
Uninsured	5.2	1.40	3.0-8.8
Non-Border Counties			
Hispanic			
Insured	9.8	0.60	8.6-11.0
Uninsured	2.9	0.33	2.2-3.5
Non-Hispanic			
Insured	18.4	0.56	17.2-19.4
Uninsured	5.7	0.72	4.4-7.3

* Estimates have a relative standard error of greater than 30 and should be used with caution as they do not meet the standards of reliability or precision.

Footnotes:

[1] Question: Have you EVER had a pneumonia shot? This shot is usually given only once or twice in a person's lifetime and is different from the flu shot. It is also called the pneumococcal vaccine.
[2] Border states: Arizona, California, New Mexico, and Texas.
[3] Counties that are within 100 kilometers (62 miles) of US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region. This includes 44 border counties identified by US-Mexico Border Health Commission, plus Maricopa County, Arizona.
[4] Counties that belong to the 4 border states that are more than 100 kilometers (62 miles) of the US-Mexico border, defined under La Paz agreement (1987) as the US portion of the US-Mexico border region, except Maricopa County, Arizona.
[5] Person of Hispanic or Latino origins may be of any race or combination of races. Similarly, the category "Non-Hispanics or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.
[6] A person was defined as "uninsured" if he or she did not have any private health insurance, Medicare, Medicaid, SCHIP, state-sponsored or other government sponsored health program, or military plan at the time of the interview. This classification also includes individuals who have only Indian Health Services coverage or hand only a private plan that paid for one type of service such as accidents or dental care.
[7] Without insurance coverage at the time of the interview.

Data source: National Health Interview Survey, 2000-2004 (In-house version)

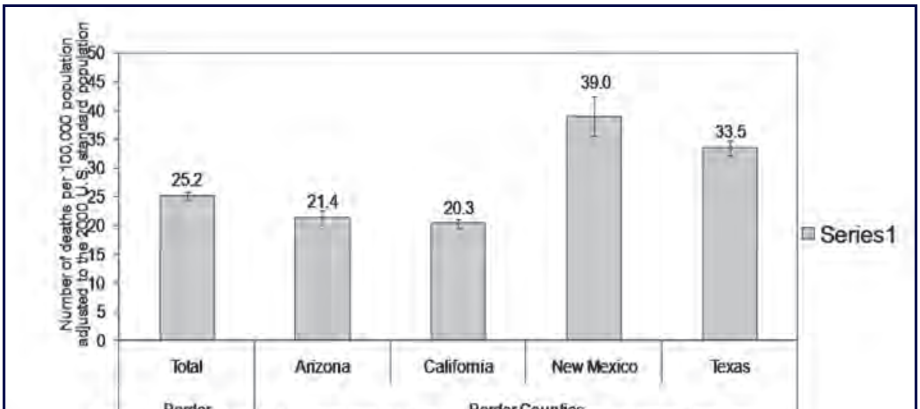
APPENDIX TO CHAPTER 7

Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard

	Rate	SE	CI -	CI+
Border	26.0	0.37	25.27	26.72
Arizona border	21.0	0.72	19.57	22.40
Cochise	21.7	2.34	17.09	26.26
Pima	20.7	0.84	19.09	22.38
Santa Cruz	18.5	4.16	10.31	26.61
Yuma	23.5	2.07	19.42	27.53
California border	19.4	0.48	18.47	20.37
Imperial	28.5	2.83	23.00	34.08
San Diego	19.0	0.49	18.05	19.97
New Mexico border	37.9	1.98	33.98	41.73
Doña Ana	50.0	3.29	43.59	56.50
Otero	28.2	3.87	20.60	35.78
Texas border	38.1	0.84	36.48	39.78
Cameron	40.1	2.09	36.03	44.23
El Paso	45.3	1.66	42.08	48.60
Hidalgo	34.5	1.57	31.44	37.58
Maverick	35.4	5.55	24.51	46.26
Starr	19.1	3.92	11.39	26.77
Val Verde	27.2	4.56	18.27	36.13
Webb	43.2	3.30	36.74	49.67

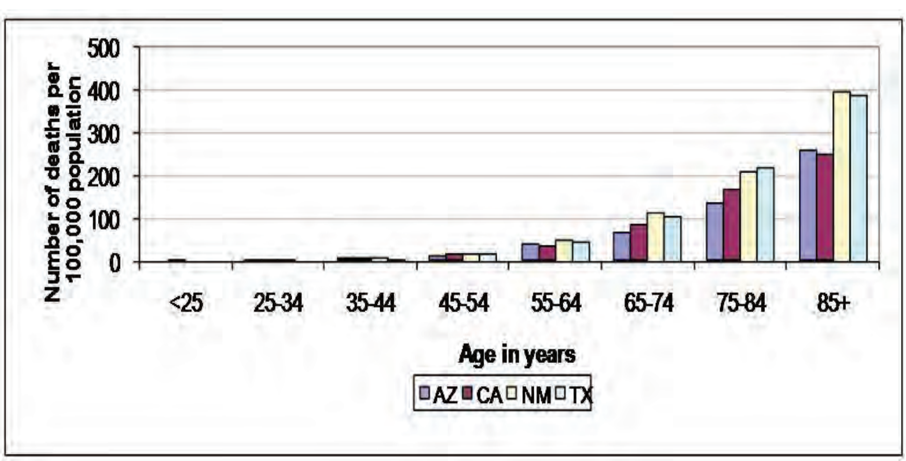
CT	USA_2000	std err
TT_BRD_44 CT	25.2	0.626472618
AZ_TT_BRD_44_CT	21.4	1.251202418
CA_TT_BRD__44_CT	20.3	0.850756622
NM_TT_BRD__44_CT	39.0	3.468365077
TX_TT_BRD_44_CT	33.5	1.351106963

	CT	USA_2000	std err
Border	Total	25.2	0.626472618
Border Counties	Arizona	21.4	1.251202418
	California	20.3	0.850756622
	New Mexico	39.0	3.468365077
	Texas	33.5	1.351106963



Source: 2004 mortality data, NCHS. p-values were < 0.05 for differences between Arizona, New Mexico, Texas, and USA, and between California, New Mexico, Texas, and USA. Differences were not significant between Arizona and

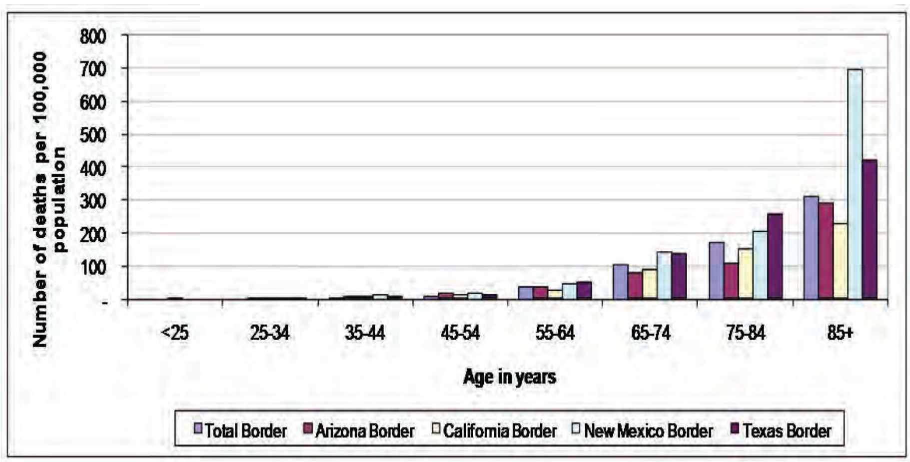
2004	<25	25-34	35-44	45-54	55-64	65-74	75-84	85+
AZ	0.0	2.0	5.5	13.2	38.4	67.7	135.0	256.2
CA	0.4	1.2	3.7	12.2	33.1	84.2	165.1	248.8
NM	0.0	3.8	7.5	16.7	50.8	112.8	209.9	395.3
TX	0.2	1.4	4.5	16.3	46.0	104.4	219.1	388.6

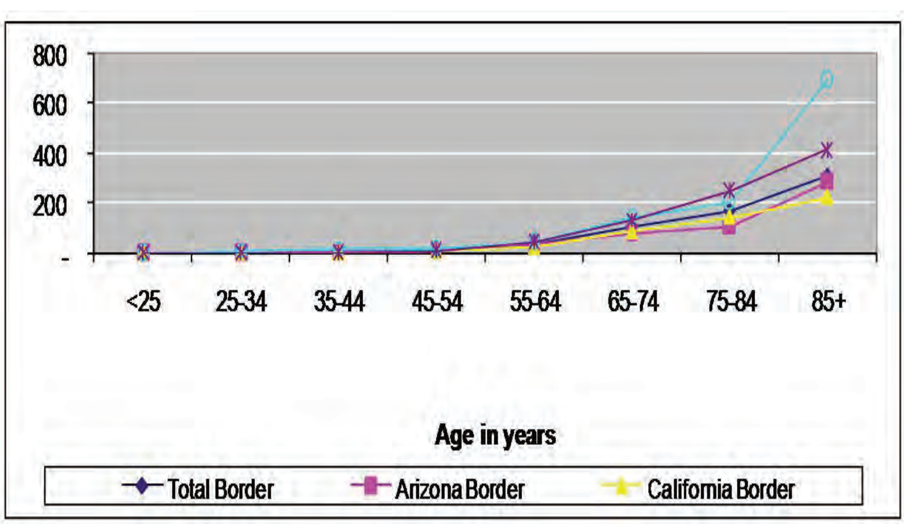


Diabetes Mortality Rates US-MX Border

2004

CT	<25	25-34	35-44	45-54	55-64	65-74	75-84	85+
Total Border	0.19	1.71	4.61	12.04	36.33	103.14	172.28	311.87
Arizona Border	-	1.82	7.33	16.08	37.28	80.77	105.91	289.14
California Border	0.44	1.91	3.18	9.71	26.04	87.28	147.62	226.86
New Mexico Border	-	4.94	14.53	17.01	47.53	142.68	207.51	696.71
Texas Border	-	0.94	4.00	12.45	49.13	134.08	254.40	420.02





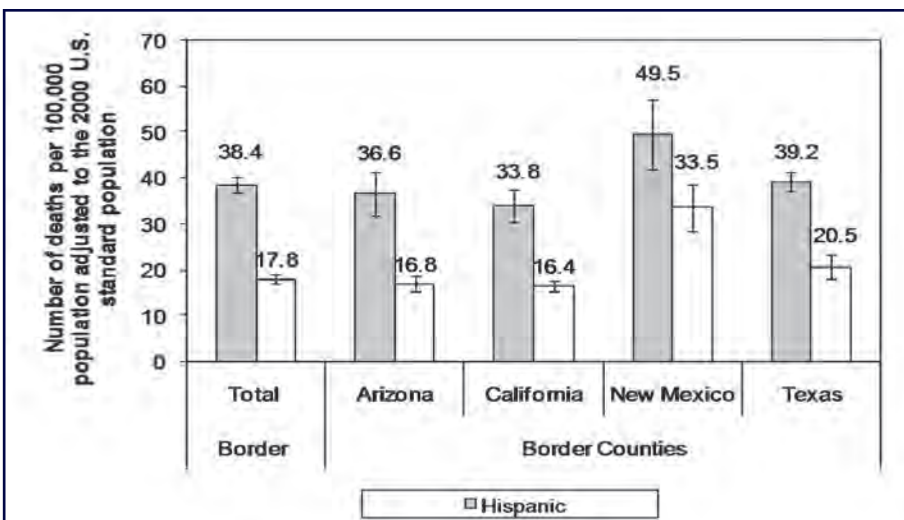
2004 Border HSP Diabetes Mortality Rates

CT	Race	ICD	Sex	All	<1	01T04	5T14Y	15t24Y	25t34Y	35t44	45t54Y	55t64T	65t74Y	75t84Y	85+	USA 2000	va	std err	LCL	UCL
TT_BRD_44 CT	HSP	52) E10-E14 DIABETES MELLITUS	TT	22.22	-	-	-	-	1.47	3.73	15.18	50.92	160.73	282.14	506.78	38.42	2.5773	1.61	35.27	41.57
AZ_TT_BRD_44_CT	HSP	52) E10-E14 DIABETES MELLITUS	TT	19.51	-	-	-	-	1.44	8.18	21.20	40.76	157.98	194.85	614.20	36.63	22.3269	4.73	27.37	45.89
CA_TT_BRD_Male_44_CT	HSP	52) E10-E14 DIABETES MELLITUS	TT	15.26	-	-	-	-	1.21	2.13	16.35	38.14	160.99	241.55	408.58	33.84	12.1484	3.49	27.01	40.67
NM_TT_BRD_MALE_44_CT	HSP	52) E10-E14 DIABETES MELLITUS	TT	33.75	-	-	-	-	8.16	4.30	24.86	63.55	188.39	339.39	720.98	49.54	57.9560	7.61	34.62	64.46
TX_TT_BRD_44_CT	HSP	52) E10-E14 DIABETES MELLITUS	TT	25.19	-	-	-	-	1.06	3.51	12.39	56.32	158.39	304.48	500.61	39.17	4.4888	2.12	35.02	43.33
TT_BRD_44 CT	NHW	52) E10-E14 DIABETES MELLITUS	TT	25.07	-	-	-	0.59	2.05	6.20	6.95	24.36	66.58	116.85	242.52	17.83	0.8632	0.93	16.01	19.65
AZ_TT_BRD_44_CT	NHW	52) E10-E14 DIABETES MELLITUS	TT	25.53	-	-	-	-	2.50	7.90	10.68	30.18	53.02	88.65	235.67	6.83	2.8846	1.70	13.50	20.16
CA_TT_BRD_Male_44_CT	NHW	52) E10-E14 DIABETES MELLITUS	TT	20.68	-	-	-	0.99	2.27	4.45	4.72	20.96	66.84	117.71	199.99	16.43	1.4504	1.20	14.07	18.79
NM_TT_BRD_MALE_44_CT	NHW	52) E10-E14 DIABETES MELLITUS	TT	49.77	-	-	-	-	-	25.18	10.37	33.50	114.97	145.41	708.08	33.51	25.4825	5.05	23.62	43.40
TX_TT_BRD_44_CT	NHW	52) E10-E14 DIABETES MELLITUS	TT	37.16	-	-	-	-	-	5.59	9.83	21.99	74.89	157.53	278.61	20.48	7.2756	2.70	15.20	25.77

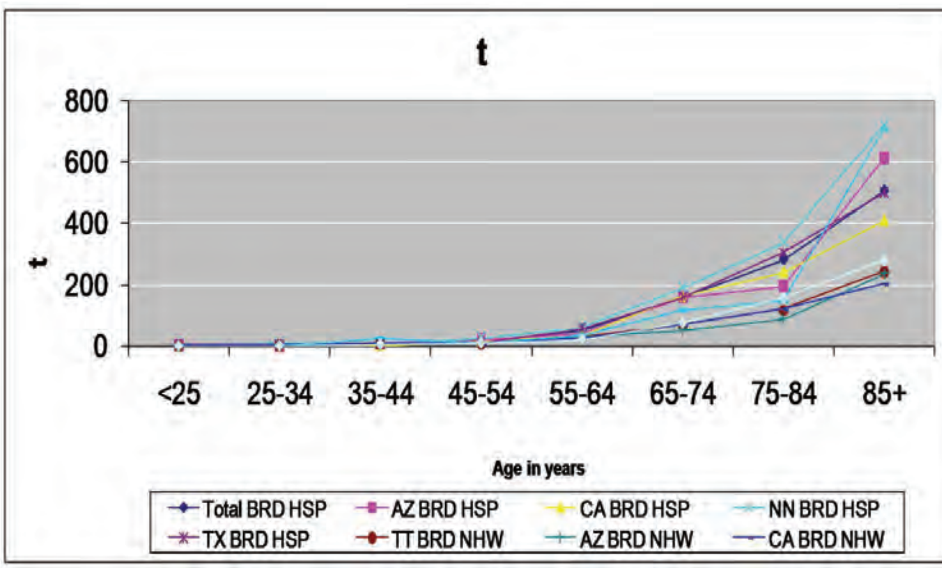
CT	Race	ICD	Sex	All	<1Y	01T04	5T14Y	15t24Y	25t34Y	35t44	45t54Y	55t64T	65t74Y	75t84Y	85+
TT_BRD_44 CT	HSP	52) E10-E14 DIABETES MELLITUS	TT	22.22	-	-	-	-	1.47	3.73	15.18	50.92	160.73	282.14	506.78
AZ_TT_BRD_44_CT	HSP	52) E10-E14 DIABETES MELLITUS	TT	19.51	-	-	-	-	1.44	8.18	21.20	40.76	157.98	194.85	614.20
CA_TT_BRD_Male_44_CT	HSP	52) E10-E14 DIABETES MELLITUS	TT	15.26	-	-	-	-	1.21	2.13	16.35	38.14	160.99	241.55	408.58
NM_TT_BRD_MALE_44_CT	HSP	52) E10-E14 DIABETES MELLITUS	TT	33.75	-	-	-	-	8.16	4.30	24.86	63.55	188.39	339.39	720.98
TX_TT_BRD_44_CT	HSP	52) E10-E14 DIABETES MELLITUS	TT	25.19	-	-	-	-	1.06	3.51	12.39	56.32	158.39	304.48	500.61
TT_BRD_44 CT	NHW	52) E10-E14 DIABETES MELLITUS	TT	25.07	-	-	-	0.59	2.05	6.20	6.95	24.36	66.58	116.85	242.52
AZ_TT_BRD_44_CT	NHW	52) E10-E14 DIABETES MELLITUS	TT	25.53	-	-	-	-	2.50	7.90	10.68	30.18	53.02	88.65	235.67
CA_TT_BRD_Male_44_CT	NHW	52) E10-E14 DIABETES MELLITUS	TT	20.68	-	-	-	0.99	2.27	4.45	4.72	20.96	66.84	117.71	199.99
NM_TT_BRD_MALE_44_CT	NHW	52) E10-E14 DIABETES MELLITUS	TT	49.77	-	-	-	-	-	25.18	10.37	33.50	114.97	145.41	708.08
TX_TT_BRD_44_CT	NHW	52) E10-E14 DIABETES MELLITUS	TT	37.16	-	-	-	-	-	5.59	9.83	21.99	74.89	157.53	278.61

Border	Total	HSP	38.42	1.61
		NHW	17.83	0.93
Border Counties	Arizona	HSP	36.63	4.73
		NHW	16.83	1.70
	California	HSP	33.84	3.49
		NHW	16.43	1.20
	New Mexico	HSP	49.54	7.61
		NHW	33.51	5.05
	Texas	HSP	39.17	2.12
		NHW	20.48	2.70

		Hispanic	Non-Hispanic White	HSP_CI	NHSP_CI
Border	Total	38.4	17.8	1.61	0.93
Border Counties	Arizona	36.6	16.8	4.73	1.70
	California	33.8	16.4	3.49	1.20
	New Mexico	49.5	33.5	7.61	5.05
	Texas	39.2	20.5	2.12	2.70

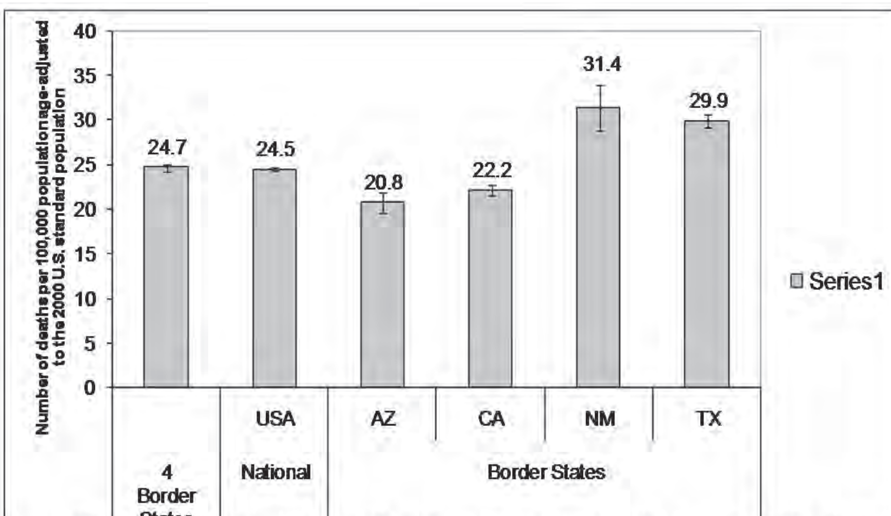


CT	<25	25-34	35-44	45-54	55-64	65-74	75-84	85+
Total BRD HSP	0.0	1.5	3.7	15.2	50.9	160.7	282.1	506.8
AZ BRD HSP	0.0	1.4	8.2	21.2	40.8	158.0	194.8	614.2
CA BRD HSP	0.0	1.2	2.1	16.3	38.1	161.0	241.5	408.6
NN BRD HSP	0.0	8.2	4.3	24.9	63.5	188.4	339.4	721.0
TX BRD HSP	0.0	1.1	3.5	12.4	56.3	158.4	304.5	500.6
TT BRD NHW	0.6	2.0	6.2	6.9	24.4	66.6	116.8	242.5
AZ BRD NHW	0.0	2.5	7.9	10.7	30.2	53.0	88.6	235.7
CA BRD NHW	1.0	2.3	4.5	4.7	21.0	66.8	117.7	200.0
NM BRD NHW	0.0	0.0	25.2	10.4	33.5	115.0	145.4	708.1
TX BRD NHW	0.0	0.0	5.6	9.8	22.0	74.9	157.5	278.6



Diabetes Mortality Rates US-MX Border

		USA_2000	std err	SD
4 Border States		24.7	0.21	0.41
National	USA	24.5	0.09	0.18
Border States	AZ	20.8	0.60	1.18
	CA	22.2	0.26	.52
	NM	31.4	1.31	2.56
	TX	29.9	0.41	0.80



Source: 2004 mortaity data, NCHS. P-values were <0.05 for difference between Arizona, New Mexico, Texas, and USA, and between

	Mortality Rate per 100,000 PP _04	Sex	All ages	<1Yr	01T04	5T14yR	15T24YR	25T34YR	35T44YR	45T54YR	55T64YR	65T74YR	75T84YR	85+	Old	New	USA_2000
4 States	52) E10-E14 DIABETES MELLITUS	TT	21.76	0.00	0.00	0.10	0.28	1.39	4.21	13.81	38.44	90.07	180.12	293.45	14.03	16.39	24.72
AZ	52) E10-E14 DIABETES MELLITUS	TT	20.77	0.00	0.00	0.12	0.00	2.05	5.50	13.22	38.37	67.72	134.96	256.15	12.18	14.09	20.82
CA	52) E10-E14 DIABETES MELLITUS	TT	19.82	0.00	0.00	0.07	0.37	1.16	3.70	12.20	33.11	84.20	165.06	248.83	12.60	14.74	22.18
NM	52) E10-E14 DIABETES MELLITUS	TT	30.74	0.00	0.00	0.00	0.00	3.81	7.53	16.74	50.78	112.75	209.86	395.27	18.10	21.02	31.41
TX	52) E10-E14 DIABETES MELLITUS	TT	24.34	0.00	0.00	0.15	0.23	1.41	4.49	16.30	46.01	104.42	219.10	388.63	16.73	19.60	29.94

	Mortality Rate per 100,000 PP _04	Sex	<1Year	01T04	5-14Yr	15T24Yr	25T34yr	35T44Yr	45T54Yr	55T64Yr	65T74Yr	75T84Yr	85+	Var	STD ERROR	LCL	UCL
4 States	52) E10-E14 DIABETES MELLITUS	TT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.04	0.21	24.31	25.12
AZ	52) E10-E14 DIABETES MELLITUS	TT	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.05	0.07	0.11	0.0	0.36	0.60	19.63	22.00
CA	52) E10-E14 DIABETES MELLITUS	TT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.01	0.07	0.26	21.66	22.69
NM	52) E10-E14 DIABETES MELLITUS	TT	0.00	0.00	0.00	0.00	0.03	0.07	0.11	0.19	0.39	0.55	0.35	1.70	1.31	28.86	33.97
TX	52) E10-E14 DIABETES MELLITUS	TT	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.06	0.04	0.17	0.41	29.14	30.73

Diabetes Mortality Rates US-MX Border

2004	US_Mortality Rates_2004	Sex	All Ages	<1Year	01T04	5-14Yr	15T24Yr	25T34yr	35T44Yr	45T54Yr	55T64Yr	65T74Yr	75T84Yr	85+	USA_2000	var	std err	LCL	UCL
US	52) E10-E14 DIABETES MELLITUS	TT	24.91	0.02	0.05	0.09	0.39	1.50	4.59	13.38	37.07	87.16	176.90	306.98	24.51	.0082	0.09	24.33	24.68

Diabetes Mortality Rates US-MX Border

2004		USA_2000	std err	SD
	AZ	20.82	0.60	1.18
	CA	22.18	0.26	0.52
	NM	31.41	1.31	2.56
	TX	29.94	0.41	0.80
	All 4 States	4.72	0.21	0.41
	US	24.51	0.09	0.18

FURTHER READING

This list provides a starting place for those interested in health issues in the U.S.-Mexico border region. It is a non-exhaustive list of suggested further reading, conceived as a guide to essential writings and resources that can be used by policy makers, public health officials, students, and others interested in the health challenges faced by those working in the U.S.-Mexico border region.

Books

Bruhn, J.G. & Brandon, J.E. (Eds.). (1997). *Border Health: Challenges for the United States and Mexico*. New York: Garland Publishing.

A collection of essays that seeks to describe the challenges presented by the amalgam of two cultures relative to health issues resulting from pollution, economic development, and social contact.

Curiel, H., & Land, H. (2007) *Outreach and care approaches to HIV/AIDS along the U.S.-Mexico border*. Binghamton, NY: Haworth Press.

This book provides insight into the complex factors influencing the control of HIV/AIDS along the U.S.-Mexico border. The book presents in-depth insights into the problems of language differences, lack of resources, poverty, culture, social stigma, fear of rejection, and other pressing issues. Practical approaches and strategies are detailed, with an emphasis on culturally sensitive health-care practices.

Power, J.G., Byrd, T. (1998). *U.S.-Mexico border health: Issues for regional and migrant populations*. Thousand Oaks, CA: Sage Publications.

A compilation of fifteen research studies and practitioner reports on health concerns in the border region.

Warner, D.C. & Scheider, P.G., (2004). *Cross-border health insurance: Options for Texas*. U.S.-Mexican Policy Reports Series 12. New York: Sage Publications.

This book examines the development of new cross-border health insurance programs in California that provide coverage in Mexico to U.S. enrollees and considers the potential use of such models in Texas, the state with the highest percentage of uninsured persons in the nation.

Journal Articles

Belson, M., S. Kieszak, W Watson, K.M.. Blindauer, K. Phan, L. Backer, & Carol Rubin. (2003). Childhood pesticide exposures on the Texas-Mexico border: clinical manifestations and poison center use. *American Journal of Public Health*, 93,(8). pp 1310-1315.

Preventing Chronic Disease, Volume 5: No. 4, October 2008. http://www.cdc.gov/pcd/issues/2008/oct/toc.htm. Methods, results and binational commentary on reproductive health surveillance in the border region are the theme of this issue of the journal.

Stephen, G., M.K. O'Rourke, McRill, C., Flood, T., Mack, M., & M. Lebowitz. (2003). Assessment of respiratory symptoms and asthma prevalence in a U.S.-Mexico Border Region, *Archives of Environmental Health* 58(3): 156-162.

Varady, R., & Mack, M. (1995). Transboundary water resources and public health in the U.S.-Mexico Border Region," *Journal of Environmental Health* 57(8): 8-14.

Conference Proceedings and Reports

Dutton, R.J., Weldon, M., Shannon, J., Bowcock, C., Tackett-Gibson, M., Blakely, C., et al. (2000). S*urvey of health and environmental conditions in Texas border counties and colonias*. Austin TX: Texas Department of Health, Office of Border Health.

The results of *Survey of Health and Environmental Conditions in Texas Border Counties and Colonias* are presented in this report. This population-based household survey was the first comprehensive description of health and environmental conditions facing Texas families living near the U.S.-Mexico border. The results provide a baseline of information for development of targeted interventions by agencies working with border residents to improve the quality of life and health. The baseline can be used to evaluate the success of follow-up interventions and to identify high-risk subgroups.

Perkins, J.L.., Zavaleta, A.N. Mudd, G., Bollinger, M., Muirhead, Y., & Cisneros, J. (2001). *The Lower Rio Grande Valley Community Health Assessment*. Houston, TX: University of Texas, Health Science Center at Houston, School of Public Health. Retrieved September 10, 2007 from http://www.sph.uth.tmc.edu/uploadedFiles/Regional_Campuses/Brownsville/LRGV_ASSESSMENT.pdf

This report summarizes the results of the Lower Rio Grande Valley Community Health Assessment, which was conducted from 2000-2001. The main goals of the assessment were to determine health status of residents in the Lower Rio Grande Valley, assess the capacity of the public health infrastructure in the region, and assist with the implementation of the University of Texas MPH program. The counties of Cameron, Hidalgo, Starr, and Willacy constituted the assessment region for this project.

Warner, D.C. (Project Director). (2003). *Health workforce needs: opportunities for U.S.-Mexico collaboration*, Vols I and II. Austin and San Antonio, TX: Center for Health and Social Policy, Lyndon B. Johnson School of Public Affairs, University of Texas at Austin and the Regional Center for Health Workforce Studies, Center for Health Economics and Policy, University of Texas at San Antonio. Retrieved September 9, 2007 from http://www.utexas.edu/lbj/faculty/warner/prp0203/papers.pdf

This publication is the product of a year-long policy research project at the Lyndon B. Johnson School of Public Affairs at the University of Texas at Austin. As Mexico and the United States have become increasingly economically integrated, and as many Mexicans live and work in the United States on a temporary or permanent basis, it has become important that social services such as education and health also become more interconnected and responsive.

A conference was held on March 28, 2003, at the Lyndon B. Johnson School of Public Affairs in Austin, Texas, to bring together a number of experts in the field from Mexico and the United States. The title of the conference was “Responding to Unmet Needs through

International Collaboration for Health Professionals: The Case of the U.S. and Mexico." Both the conference proceedings (Section I) and the background papers (Section II) identify barriers to and opportunities for increased cross-border collaboration in training, licensure, and practice of physicians, dentists, and nurses.

Warner, D.C., & Reed, K. (1993). *Health care across the border: The experience of U.S. citizens in Mexico*. U.S.-Mexican Policy Report no. 4. Austin TX: Lyndon B. Johnson School of Public Affairs, The University of Texas.

This exploratory report examines cross-border use of health services in the U.S.-Mexico border region. It is one of the few available reports on the use of health services in Mexico by U.S. citizens and residents and, conversely, the use of U.S. health services by citizens and residents of Mexico.

Centers for Disease Control and Prevention. (2001, Jan 19). Preventing and controlling tuberculosis along the U.S.-Mexico border: work group report. *Morbidity and Mortality Weekly Report* 50,No. RR-1). Retrieved September 09, 2007 from http://www.dshs.state.tx.us/borderhealth/pdf/CDC_TB_inborder_RR5001.pdf

In June 1999, to facilitate future discussions with Mexican counterparts, the Centers for Disease Control and Prevention (CDC) convened a meeting of tuberculosis control officials from the four U.S. states bordering Mexico (i.e., California, Arizona, New Mexico, and Texas) to address TB prevention and control in the border area. Focus areas included a) surveillance needs, b) case management and therapy completion, c) performance indicators and program evaluation, and d) research needs. Meeting participants' deliberations and resulting proposals for action by CDC and state and local tuberculosis control programs are detailed in this report.

Internet Resources

U.S.-Mexico Border Health Commission
www.borderhealth.org
www.saludfronteriza.org.mx

USA-Mexico Border Health Rural Assistance Center
http://borderhealth.raconline.org

Pan American Health Organization, United States-Mexico Border Office
http://www.fep.paho.org

In the United States

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Toll Free: (866) 785-9867
www.borderhealth.org

In México

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C.P. 06700 México, D.F.
Tel. and Fax: (01152-55) 3611-0765 al 67
www.saludfronteriza.org.mx