Health status of southern Arizona border counties: a Healthy Border 2010 midterm review

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ABSTRACT

Objective. *The region on the United States (US) side of the US–Mexico border consists of 44 counties in four states; populations on both sides of the border have similar health problems. Healthy Border 2010: An Agenda for Improving Health on the US–Mexico Border (HB 2010) is a binational agenda of health promotion and disease prevention for individuals in the region. This study reports on the health status of the four southern Arizona border counties.*

Methods. *Data on health indicators for Cochise, Pima, Santa Cruz, and Yuma Counties were collected from the Arizona Department of Health Services Vital Records and Statistics. Progress was calculated as a percentage made toward or away from the 2010 target. Comparisons were made between the border counties and Arizona.*

Results. *Progress toward the HB 2010 targets varied among the border counties. All border counties made progress toward the targets with the cervical cancer, hepatitis A, and teenage birthrate objectives. Most border counties moved toward the goals for breast cancer, diabetes mortality, tuberculosis, motor vehicle crashes, infant mortality from congenital abnormalities, and prenatal care. Border counties moved away from the target with the human immunodeficiency virus and infant mortality objectives.*

Conclusions. *Assessment of the HB 2010 objectives provided a comprehensive description of the health status of the population. Although the southern Arizona border counties have shown improvement in some areas, monitoring is still needed to identify the disparities that remain.*

Key words Healthy people programs; border areas; health status; border health; Arizona; Mexico; United States.

The United States (US)–Mexico border spans almost 3 150 kilometers (km) from the Pacific Ocean to the Gulf of Mexico and includes four US states, six Mexican states, 44 US counties, and 80 Mexican municipalities. The border region, defined as the area within 100 km of either side of the boundary, is home to approximately 13 million individuals and to 26 US federally recognized Native American tribes. Although each nation operates under distinct legal and political systems as well as different health care and public health systems, the US–Mexico border region is mutually dependent, sharing environmental, social, economic, cultural, and epidemiologic characteristics. More than half of the border population (6.7 million people), lives on the US side of the border. Although governed by different bodies, US and Mexican border populations are highly connected through an integrated social and economic system (1). People on both sides of the border share similar cultures and are exposed to comparable environments. Population density and poverty in urban areas near the border are high, and unincorporated communities, known as *colonias*, often have inadequate housing, roads, sewage systems, and drainage and lack a potable water supply.

Inadequate infrastructure and poverty at the border greatly influence health. Barriers to health care access include shortages of health care professionals and facilities and lack of health insurance. During 2006–2008, 18.5% to 24.9%

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of people in border communities had no health insurance coverage (2). Lack of insurance contributes to disparities in mortality and morbidity from infectious and chronic conditions. The top causes of death in the US border region are diseases of the heart, malignant neoplasms, cerebrovascular diseases, chronic obstructive pulmonary diseases, accidents, diabetes mellitus, pneumonia and influenza, Alzheimer's disease, chronic liver disease and cirrhosis, and suicide (3). While most of these causes are the same as in the rest of the United States, the age-adjusted mortality rates are higher for certain conditions, including diabetes mellitus, Alzheimer's disease, chronic liver disease and cirrhosis, and suicide (3).

Accordingly, much of the research on the health of border populations examines health disparities in chronic conditions, infectious diseases, and environmental pollutants (4–11). To address these disparities, the United States–Mexico Border Health Commission developed Healthy Border 2010: An Agenda for Improving Health on the United States–Mexico Border (HB 2010) (3). There are 11 focus areas with specific indicators totaling 21 objectives targeted for improvement, and these areas are listed in Table 1. The HB 2010 agenda was developed in 2001 to increase and improve the quality of life and years of healthy life and to eliminate health disparities. The agenda incorporates the framework of Healthy People 2010, the Healthy Gente (People) initiative established by the US and Mexican border states, and the Indicadores de Resultados used by Mexico (National Health Indicators of Mexico).

While several studies have been conducted since the release of HB 2010, they have focused on specific objectives such as diabetes, cervical cancer, water, and environmental issues (5, 7, 8, 10–13). Only one study (14) examined a broad base of health indicators at the border region and focused on the border counties in southern California. Garza et al. (14) found that southern California border counties performed better than the non-border counties in breast cancer and infant mortality health indicators but had higher rates of morbidity and mortality from tuberculosis, motor vehicle crash injury deaths, and asthma hospitalization.

Arizona is one of four states on the US–Mexico border and the border extends for approximately 350 miles. Like the other US–Mexico border states, Arizona is interconnected with its neighboring state in Mexico (Sonora). In 2007, there were approximately 8.8 million residents of the Arizona and Sonora region, with 2.5 million in Sonora and the remainder in Arizona. There are four border counties in Arizona, and these counties share the six ports of entry along the Arizona–Sonora border. The Cocopah, Tohono O'odham Nation, Pascua Yaqui, and Quechan are federally recognized tribes with homeland within the Arizona border region. The Tohono O'odham Nation reservation makes up approximately 75 miles of the border and the land spans both sides of the US–Mexico border. There is limited literature that describes changes in health indicators of Arizona border communities and if they are closer to HB 2010 goals. The primary aim of this descriptive study was to evaluate the progress of the health indicators in southern Arizona and Arizona populations in order to provide benchmarks and most recent statistics for HB 2010 goals. The authors are not aware of any assessment or monitoring reports that examine the HB 2010 goals in Arizona. Progress toward or away from these goals was determined for the four Arizona border counties between 2000 and 2007. Providing information about the health status indicators can reveal patterns of mortality and morbidity outcomes and identify areas for further health programming and research.

MATERIALS AND METHODS

Population

Four of the 24 US border counties are in Arizona—Cochise, Pima, Santa Cruz, and Yuma Counties. Arizona data were used as a standard for comparison when available. According to the US Census population 2007 estimates, there were approximately 6 338 755 residents in Arizona and 1 328 357 individuals in the combined border counties in 2007 (15). Of the approximately 1.3 million residents of the US border region, 967 089 were residents of Pima County, the most populated Arizona border county. The combined population of the three other border counties in Arizona exceeded 360 000, including 190 557 Yuma County residents, 127 866 Cochise County residents, and 42 845 residents in Santa Cruz County. Much of the Arizona border region is rural with the exception of the major metropolitan areas Nogales, Tucson, and Yuma.[4] The percentage of residents classified by the US Census Bureau as Hispanic or Latino ranged from 31.4% in Cochise County to 80.2% in Santa Cruz County. Other minority groups combined including blacks or African Americans, American Indians and Alaska Natives, Asians, Native Hawaiian, and Pacific Islanders made up less than 10% of the population in each border county. According to the US Census, Santa Cruz County was occupied by a large proportion of foreign-born individuals and more than 80% of households spoke a language other than English at home. This could have implications for their ability to seek health care within the county. Indirect evidence such as a large proportion of foreign-born residents indicates that there may also be a large proportion of recent immigrants to the area; the US Census reported that 66.6% of the foreign-born population compared with 86.5% of the native population had health insurance for all or part of the year (16).

Data acquisition methods

In order to describe the health status of the southern Arizona border populations, data were sought for each of the HB 2010 goals. Data for 2000 and 2007 were obtained from the Arizona Department of Health Services (ADHS) Bureau of Public Health Statistics, Health Status and Vital Statistics Section. The Arizona Health Status and Vital Statistics report contained partial or complete information on 15 of the 21 HB 2010 objectives. For this study, data for the health indicators were obtained from the ADHS Office of STD, HIV and Hepatitis and the Arizona Health Status and Vital Statistics report (http://www.azdhs.gov/plan). This report contains information collected from the reportable diseases and conditions obtained from medical providers and from hospital discharge data.

Data preparation and analysis

HB 2010 designated common indicators that are areas of concern regarding the health of populations along the

[4] Nogales, Santa Cruz County; Tucson, Pima County; Yuma, Yuma County.

TABLE 1. Healthy Border (HB) 2010 objectives and amendments from the HB 2010 midterm review, United States–Mexico border, 2003 (for HB 2010) and 2009 (HB 2010 midterm review)

Area, indicator, and objective	US border baseline value and 2010 target
Access to care	
Improve access to primary health care	
1. Reduce by 25% the proportion of border area residents without health insurance[a]	From 22.9% to 17.2%
Breast and cervical cancer	
Reduce cancer mortality in women through improved screening for breast and cervical cancers	
2. Reduce female breast cancer death rate by 20%	From 27.2 to 21.8 per 100 000 women
3. Reduce cervical cancer death rate by 30%	From 3.7 to 2.6 per 100 000 women
Diabetes	
Reduce morbidity and mortality from diabetes mellitus	
4. Reduce deaths due to diabetes by 10%	From 26.9 to 24.2 per 100 000 population
5. Reduce hospitalizations by 25%	From 15.4 to 11.6 per 100 000 population
Environmental health	
Improve water quality through improved sanitation and reduce amount of acute pesticide poisoning	
6. Reduce to zero the proportion of households without complete bathroom facilities[b]	Not applicable, objective deleted
7. Reduce number of hospital admissions for acute pesticide poisoning by 25%[c]	Not applicable, objective deleted
Human immunodeficiency virus (HIV) and AIDS	
Reduce transmission of HIV	
8. Reduce incidence of diagnosed HIV by 50%	From 6.7 to 3.4 per 100 000 population
Infectious disease	
Improve rates of immunization and reduce rates of infectious diseases	
9. Achieve/maintain 90% immunization coverage in children aged 19–35 months	From 77.2% to 90%
10. Reduce incidence of hepatitis A by 50%	From 10.9 to 5.5 (5.45) per 100 000 population
11. Reduce incidence of hepatitis B by 50%	From 2.2 to 1.1 per 100 000 population
12. Reduce incidence of tuberculosis by 50%	From 9.9 to 5.0 (4.95) per 100 000 population
Injury	
Reduce mortality from unintentional injuries	
13. Reduce motor vehicle crash death rate by 25%	From 13.3 to 10.0 per 100 000 population
14. Reduce childhood death rate due to unintentional injuries by 30%	From 14.7 to 10.3 per 100 000 children age 0–4
Maternal and child health	
Reduce infant mortality and increase the number of women receiving prenatal care	
15. Reduce infant mortality by 15%	From 5.4 to 4.6 per 1 000 live births
16. Reduce infant mortality from congenital abnormalities by 30%	From 1.5 to 1.05 per 1 000 live births
17. Increase proportion of mothers getting prenatal care in first trimester to 85%	From 73.2% to 85%
18. Reduce birth rate in adolescents (15–17 years old) by 33%[d]	From 43.3 to 29.0 per 1 000 women 15–17 years of age
Mental health	
Reduce the suicide mortality rate by improving mental health	
19. Reduce suicide mortality rate by 15%	From 11.0 to 9.4 per 100 000 population
Oral health	
Increase the usage of dental and oral health services	
20. Increase proportion of population using oral health services to 75% per year	From 61% to 75%
Respiratory diseases	
Reduce morbidity from asthma	
21. Reduce asthma hospitalization rate by 40%	From 10.3 to 6.2 per 100 000 population

Sources: Healthy Border 2010: an agenda for improving health on the United States–Mexico border. El Paso, TX: United States–Mexico Border Health Commission; 2003. Available from: http://www.borderhealth.org/files/res_63.pdf. Healthy Border 2010. Midterm review US border area. El Paso, TX: United States–Mexico Border Health Commission; 2009. Available from: http://www.borderhealth.org/.

[a] Amended in Healthy Border 2010 midterm review. Old objective: reduce by 25% the population lacking access to a primary care provider.

[b] Objective was deleted in Healthy Border 2010 midterm review.

[c] Objective was deleted in Healthy Border 2010 midterm review.

[d] Amended in Healthy Border 2010 midterm review. Old objective: Reduce pregnancy rate in adolescents 15–17 years old by 33%.

US–Mexico border. The progress of the objectives for populations solely on the US side of the border was examined. Mortality, incidence, birth, and hospital discharge rates were calculated by the same methods as indicated by the HB 2010 objectives and *The Arizona Health Status and Vital Statistics* report. The population denominators included Arizona residents from the geographic area under analysis when calculating the measures. For the baseline year 2000, the population estimates were drawn from the US Census Bureau. The 2007 estimates were drawn from the Arizona Department of Economic Security Population Statistics Unit projections and the National Center for Health Statistics. Causes of death and mortality rates were calculated in accordance with the *International Classification of Diseases, Tenth*

Revision (ICD–10), and morbidity calculations used the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD–9-CM).

Once the health indicators were calculated, comparisons were made between border counties, to the state and to the HB 2010 target, and progress toward the goals was calculated. The HB 2010 midterm review delineated a protocol for determining the progress of an indicator with the following calculation: progress = (baseline value – most recent value)/(baseline value – 2010 target) × 100 (17).

When sufficient data were available, the progress of each objective was measured using the year 2000 as a baseline measure and, when available, the year 2007 as the most recent available measure. To determine progress without the effect of the other populations in the border region, the baseline values of the Arizona border counties and the state were used in progress calculations and not the HB 2010 baseline measures for the entire border region. Each objective was classified as moving toward the goal, away from the goal, or no progress. An objective classified as no progress made less than 5% progress toward or away from the HB 2010 goal in the year 2007.

Human subjects

The study protocol was submitted to the University of Arizona Human Subjects Institutional Review Board for review and was deemed not applicable to human subjects as all data obtained for analysis were public-use information and contained no personal identifiers.

RESULTS

For the baseline year of 2000 and the progress year of 2007, the health status of the four southern Arizona border counties is reported. Table 2 shows the 2000 baseline and 2007 measures for each HB 2010 objective by border county. Almost all border counties showed progress toward the HB 2010 goals for cervical cancer mortality, hepatitis A, and teenage birth rate. Three of the four counties showed improvement in the goals for breast cancer, diabetes mortality, tuberculosis, motor vehicle crashes, infant mortality from congenital abnormalities, and prenatal care. Progress varied by county for hepatitis B and suicide mortality. Only one Arizona border county made progress with the human immunodeficiency virus (HIV) objective and no border county showed improvement with the infant mortality objective. Table 2 shows the change in rates or percentages by health indicator and by each Arizona border county from 2000 to 2007. Table 3 displays the percent progress made toward or away from the target of each HB 2010 objective. As mentioned above, Cochise, Santa Cruz, and Yuma Counties had populations that ranged from 43 000 to 191 000. Conditions associated with rare health events for these counties were presented but may not be reliable because of the small sample size.

Cancer

Breast cancer. Three of the four Arizona border counties made favorable progress toward the HB 2010 goal of reducing breast cancer mortality. Cochise and Pima Counties made more than 75% progress toward the goal from 2000 to 2007, although these age-adjusted mortality rates were still higher than in the Arizona population. Yuma County was an exception, surpassing the goal with a rate of 14.7 deaths per 100 000 women. The age-adjusted mortality rate in Santa Cruz County increased from 10.2 to 23.9 deaths per 100 000 women.

Cervical cancer. Arizona and its border counties have made favorable progress toward the goal of reducing cervical cancer mortality. In Cochise, Pima, and Yuma Counties, the age-adjusted cervical cancer mortality rates decreased to less than the HB 2010 target. Santa Cruz County had already exceeded the target set by HB 2010 and remained the same as a result of recording zero deaths due to cervical cancer in 2000 and 2007.

Diabetes

Mortality due to diabetes declined in all border counties except Yuma. Even though diabetes mortality in Yuma

TABLE 2. Midterm progress toward Healthy Border 2010 targets, 2000 baseline measures (rates and percentages) and 2007 progress, by objective and border county, Arizona, United States

Objective	Arizona		County							
			Cochise		Pima		Santa Cruz		Yuma	
	2000	2007	2000	2007	2000	2007	2000	2007	2000	2007
Breast cancer mortality rate[a]	25.4	20.1	27.1	21.7	25.9	20.2	10.2	23.9	20.3	14.7
Cervical cancer mortality rate[a]	3.1	1.9	1.7	0.0	3.5	2.1	0.0	0.0	2.8	1.0
Diabetes rate[b]	19.0	17.0	27.3	15.0	19.8	14.8	30.0	25.3	12.9	17.0
HIV incidence rate[b]	8.7	9.1	3.4	11.7	7.4	6.2	5.2	5.7	3.1	3.7
Hepatitis A incidence rate[b]	9.1	2.4	7.6	2.9	10.3	2.5	96.4	17.2	35.0	3.5
Hepatitis B incidence rate[b]	4.2	2.8	3.4	3.6	2.7	1.6	2.6	0.0	1.9	4.0
Tuberculosis incidence rate[b]	4.6	4.7	5.1	1.5	2.7	4.0	5.2	0.0	16.9	12.4
Motor vehicle death rate[b]	17.5	16.2	24.3	16.5	15.0	12.9	11.0	14.0	20.7	15.2
Infant mortality rate[c]	6.7	6.8	6.3	8.6	6.1	7.2	3.8	6.5	5.3	7.4
Infant mortality rate from congenital abnormalities[c]	1.6	1.5	1.7	1.6	1.3	1.4	3.8	2.6	5.3	1.2
Prenatal care (%)	71.6	77.6	67.8	81.7	68.2	71.4	67.8	65.0	60.0	62.40
Teenage birth rate[d]	41.1	32.3	41.5	27.1	37.2	26.9	53.9	38.1	48.6	39.3
Suicide mortality rate[b]	14.6	15.4	18.6	18.4	15.1	13.9	2.9	4.1	9.5	11.3

[a] Per 100 000 women.
[b] Per 100 000 population.
[c] Per 1 000 live births.
[d] Per 1 000 women 15–17 years of age.

TABLE 3. Percent progress[a] made toward or away from Healthy Border 2010 targets, 2007

Objective	Arizona (%)	County (%)			
		Cochise	Pima	Santa Cruz	Yuma
Breast cancer: reduce death rate from 27.2 to 21.8 per 100 000 women	147.2 (RD)	101.9 (RD)	139.0 (RD)	118.1 (WD)	373.3 (RD)
Cervical cancer: reduce death rate from 3.7 to 2.6 per 100 000 women	240.0 (RD)	188.9 (RD)	155.6 (RD)	0 (ND)	900.00 (RD)
Diabetes: reduce death rate from 26.9 to 24.2 per 100 000 population	38.5 (RD)[b]	396.8 (RD)	113.6 (RD)b	81.0 (RD)	36.3 (WD)
Human immunodeficiency virus: reduce incidence rate from 6.7 to 3.4 per 100 000 population	7.6 (WD)	> 500.0 (WD)[c,d]	30.3 (RD)	26.8 (WD)	193.1 (WD)[c]
Hepatitis A: reduce incidence rate from 10.9 to 5.45 per 100 000 population	183.6 (RD)	218.6 (RD)	160.8 (RD)	87.1 (RD)	106.6 (RD)
Hepatitis B: reduce incidence rate from 2.2 to 1.1 per 100 000 population	45.2 (RD)	8.7 (WD)	68.8 (RD)	173.3 (RD)	262.5 (RD)
Tuberculosis: reduce incidence rate from 9.9 to 4.95 per 100 000 population	28.6 (WD)[c]	> 500.0 (WD)[d]	57.8 (WD)[c]	> 500.0 (WD)[d]	37.7 (RD)
Motor vehicle deaths: reduce rate from 13.3 to 10.0 per 100 000 population	17.3 (RD)	54.5 (RD)	42.0 (RD)	300.0 (WD)	51.4 (RD)
Infant mortality: reduce rate from 5.4 to 4.6 per 1 000 live births	4.8 (RD)	135.3 (WD)	73.3 (WD)	337.5 (WD)[c]	300.0 (WD)
Birth defects: reduce death rate from 1.5 to 1.05 per 1 000 live births	20.0 (RD)	18.2 (RD)	95.5 (WD)	43.2 (RD)	96.9 (RD)
Prenatal care in 1st trimester: raise from 73.2% to 85%	44.8 (RD)	80.8 (RD)	19.0 (RD)	16.3 (WD)	9.6 (RD)
Teen births: reduce rate of live births to teens from 43.3 to 29.0 per 1 000 women 15–17 years of age	72.7 (RD)	115.2 (RD)	125.5 (RD)	63.50	47.4 (RD)
Suicide deaths: reduce rate from 11.0 to 9.4 per 100 000 population	15.4 (WD)	2.2 (RD)	21.1 (RD)	18.5 (WD)[c]	> 500.0 (WD)[d]

Note: RD: right direction, ND: no direction, WD: wrong direction.
[a] Progress = (baseline value – most recent value)/(baseline value – year 2010 target) × 100.
[b] The 2000 rate was below target and continued to decrease in 2007.
[c] The 2000 rate was below target but moved in the wrong direction in relation to the target in 2007.
[d] Percent change was greater than 500%. This occurred when the 2000 rate was close to the 2010 target or when a small number of health events were involved.

County was greater in 2007 than in 2000, the age-adjusted mortality rate remained below the HB 2010 target. The greatest progress in reducing mortality was in Cochise County. The 2000 age-adjusted diabetes mortality rate was 27.3 per 100 000 persons and it decreased in 2007 to 15.0 per 100 000 persons, surpassing the HB 2010 goal. Santa Cruz County made 81.03% progress with rates decreasing from 30 to 25.3 deaths per 100 000 persons from 2000 to 2007.

Infectious diseases

HIV. HIV/AIDS incident case rates increased between 2000 and 2007 in all the border counties except Pima and in the Arizona population. Poor progress was noted in Cochise County, which had the highest overall rate of HIV infections of all Arizona–Mexico border counties with a rate of 11.7 incident cases per 100 000 persons, up from 3.4 incident cases per 100 000 persons. In 2000, the HIV incident case rate for Cochise County was 3.39, higher than Yuma County's rate of 3.11.

Hepatitis A and hepatitis B. Hepatitis A rates decreased in all border counties. The 2007 hepatitis A rates for Arizona, Cochise County, Pima County, and Yuma County all fell below the 2010 target of 5.5 incident cases per 100 000 persons. Santa Cruz County made 87% progress in reducing cases from 96.4 per 100 000 in 2000 to 17.2 cases per 100 000 in 2007.

Only two counties showed favorable progress in reducing the incidence of hepatitis B. The incidence rates in Pima and Santa Cruz Counties decreased, while the incidence rates in Cochise and Yuma Counties increased. Cochise and Yuma Counties had higher incidence rates for hepatitis B than the entire state of Arizona.

Tuberculosis. Transmission of tuberculosis (TB) has decreased in Arizona and in three border counties since 2000. In 2007, the state of Arizona and Pima County remained below the HB 2010 goal but showed an increase in TB rates compared with 2000 rates. Even though Yuma County made almost 40% progress toward the target, the incidence rate of 12.4 incident cases per 100 000 persons was more than 2.6 times that of Arizona (4.7 incident cases per 100 000 persons).

Injury prevention: motor vehicle crash mortality

Motor vehicle crash mortality remained a concern for the border counties. While Cochise, Pima, and Yuma Counties made progress toward the 2010 goal, Santa Cruz did not. Both Cochise and Yuma Counties progressed more than 50% toward the HB 2010 goal. There were 16.5 motor vehicle crash deaths per 100 000 persons in Cochise County, the only region that had a rate higher than the state.

Maternal, infant, and child health

Infant mortality: all causes and congenital abnormalities. The infant mortality rate in Arizona and the border counties increased in 2007 as did the infant mortality rate due to congenital abnormalities in Pima County. Santa Cruz was the only county that had a lower infant mortality

rate (6.5 deaths per 1 000 live births) than the state of Arizona (6.8 deaths per 1 000 live births). However, while infant deaths due to congenital abnormalities declined in most border counties, notable disparities existed, with Santa Cruz County having more than 1.7 times the rate for Arizona. Yuma County made more than 96% of the progress needed to reach the goal for reducing infant mortality due to congenital abnormalities down to 1.2 deaths per 1 000 live births.

Prenatal care. All southern Arizona border counties except Santa Cruz County made improvements in the proportion of mothers receiving prenatal care in their first trimester, despite not reaching the 85% target. In 2007, Cochise County had the highest coverage of prenatal care (81.7%) of all the border counties and also fared better than Arizona (77.6%). Additionally, Cochise County made the best progress toward reaching the HB 2010 goal (80.81%). Yuma County had the lowest percentage (62.4%) and was furthest from meeting the 2010 target.

Teenage birthrate. All four border counties made progress toward reducing teenage birth rates and two of the border counties attained birth rates that were less than the state rate. Cochise and Pima Counties achieved rates lower than the HB 2010 goal in 2007. Santa Cruz and Yuma Counties made 63.45% and 47.39% progress, respectively. Despite this progress, Santa Cruz and Yuma Counties still had birth rates above the state as a whole in the 15- to 17-year age group.

Mental health: intentional self-harm (suicide)

Age-adjusted suicide rates fell in Cochise and Pima Counties but increased in Santa Cruz and Yuma Counties. Despite the unfavorable progress, Santa Cruz County remained below the HB 2010 target in 2007. Age-adjusted suicide rates increased in Yuma County from 9.5 to 11.3 deaths per 100 000 persons. Cochise (18.4 deaths per 100 000 persons) was the only border county that experienced a suicide rate higher than the state of Arizona (15.4 deaths per 100 000 persons).

DISCUSSION

While progress toward many of the HB 2010 goals is evident, there are still disparities in the border counties of Arizona. As clear progress was evident in some of the focus areas, other areas showed no improvement or a decline in the population's health status. Additionally, there was variation in progress among the border counties. Pima County made progress toward the goal or improved for 10 of the 11 objectives, Cochise County for nine objectives, Santa Cruz County for six objectives, and Yuma County for eight objectives. Santa Cruz County moved away from the goal for six of the objectives and Yuma County made poor progress with five objectives.

Improving indicators

Health indicators from HB 2010 were explored. Changes in Arizona as a whole were compared with changes in the four counties along the Arizona–Mexico border.

Cervical cancer mortality

In each border county, cervical cancer surpassed the HB 2010 goal, but access to cervical cancer screenings remains an issue for certain groups in the border region and southern Arizona. Since 2000, the age-adjusted cervical cancer mortality rates have declined overall in Arizona as well as in the border counties, and the female population consistently showed rates lower than the HB 2010 target. One study demonstrated that US women living in border populations are more likely to receive Pap tests than Mexican women living in the border region (8). Likewise, a comparative study found that breast and cervical cancer screening rates among non-Hispanic women who reside in border counties compared favorably with those of non-Hispanic women in the rest of the United States (18). Notably, the incidence rates of cervical cancer were higher among Hispanic women in border counties and states than among Hispanic women in non-border states, especially in women over the age of 65 (18).

The Well Woman Healthcheck Program (WWHP) is a statewide program that provides breast and cervical cancer screenings to women who otherwise would not likely have access to these services. The WWHP has provided screenings to eligible women since 1995. However, the number of women screened has increased by nearly one-third due to an increase in funds from the state legislature since 2003 (19). Despite efforts and increased access made by programs like the WWHP, women who reside in border counties continue to experience high rates of cervical cancer, especially Hispanic women (18). Because cervical cancer mortality is preventable and is present in the border areas at a rate higher than in the nation as a whole, additional efforts should aim to increase the screening of high-risk populations in Arizona's border counties.

Hepatitis A

Hepatitis A is an acute infection of the liver and its occurrence is generally associated with low socioeconomic status and poor hygienic or sanitary conditions (20). Excess morbidity due to hepatitis A along the US–Mexico border region has been documented. Doyle and Bryan (4) showed that incidence rates for hepatitis A were significantly higher in the border region than in the non-border counties of US border states and also in US non-border states. Other studies conducted in Texas border communities showed that past infection in school children was associated with inadequate excreta disposal, low maternal educational attainment, being in first grade, having lived in Mexico for more than 6 months, and household crowding (21). Decreased morbidities with hepatitis A are attributed to improved hygienic conditions or vaccinations. Vaccinations can be beneficial to high-risk communities and populations in Arizona border communities. Much of the information known about hepatitis A in Arizona populations has examined the effect of the mandated immunization or surveillance in child-care centers and has yet to target border populations (22–24). Notably, a study in Maricopa County, Arizona (24), examined the infection rates of hepatitis A after the mandated vaccination of child-care center attendees and found a decline in the infection rates in the targeted age groups of the children and in residents of the county.

Improving indicators for most border counties

Most counties showed progress toward the HB 2010 target for breast cancer, diabetes mortality, tuberculosis,

motor vehicle crashes, infant mortality from congenital abnormalities, and prenatal care. Santa Cruz County was often the exception to improvement of an indicator among the four border counties. This was the case for the breast cancer mortality, motor vehicle crash death rate, and infant mortality objectives as it was the only border county to show movement away from the target. Specifically, for the breast cancer objective, in 2007 the other three border counties reached the target of reducing the age-adjusted female breast cancer mortality rate while Santa Cruz more than doubled the rate from the 2000 baseline measure. Santa Cruz is the smallest of the border counties and of all counties in Arizona; thus, an extended time period may be necessary for rate stabilization. However, analysis is needed to identify trends in health indicators in this county.

Diabetes mortality

Diabetes is a major health concern in Arizona, especially for certain racial and ethnic minority groups. In 2007, it was the fourth leading cause of death among Arizona American Indians and Alaska Natives and the fifth leading cause among Arizona blacks or African Americans and Hispanics or Latinos (25). Previous estimates have shown that Mexican Americans have among the highest prevalence of diabetes in Hispanic and Latino subgroups (26–28). In 2001–2002, the US–Mexico Border Diabetes Prevention and Control Project estimated that 1.2 million (15.7%) adults living in the border region had diabetes and 700 000 lived on the US side of the border (29).

Remarkably, the age-adjusted diabetes death rate for the Arizona border counties is lower than the rate for the US and the combined border county population reported in the HB 2010 midterm review. Likewise, Albertorio-Diaz et al. (12) found that Arizona and California border residents had lower diabetes hospitalization discharge rates than Texas border residents. The reason for the significant differences in mortality and discharge rates among border states is not well understood, and further research is warranted.

Tuberculosis

TB is known to be a major health concern in Yuma County. Since 2000, Yuma County residents have consistently experienced the highest rates of TB among the Arizona border counties. Yuma County had a TB case rate in 2007 of 12.4 per 100 000, which is more than 2.5 times greater than the Arizona rate (4.7 per 100 000). Furthermore, the county accounted for 8% of the 302 statewide cases but comprises only 3% of the state's population (29).

In the US, TB disproportionately affects foreign-born individuals and racial and ethnic minorities (30). In 2007, the TB rate was higher among foreign-born persons in the US (20.6 per 100 000 population) than among US-born persons (4.4 per 100 000 population) and higher in the American Indian, Alaska Native, Asian, black, and Hispanic populations compared with non-Hispanic whites (31). The ADHS *Tuberculosis Surveillance Report Arizona, 2007* (31) showed similar trends among these demographic groups. For Arizona, 57% of foreign-born TB cases were from Mexico, demonstrating the importance of binational collaboration in TB prevention and control. One such example of collaboration is the informal agreement between Arizona and Sonora health departments called the "Meet and Greet" program. In order to ensure continuity of care for TB patients, health officials from Sonora, Mexico, meet the individuals who are being deported to Mexico through Sonora to assume responsibility and oversight of treatment (32). These programs as well as other surveillance and monitoring systems, such as the Early Warning Infectious Disease Surveillance and Border Infectious Disease Surveillance programs, are essential to the success of TB prevention and control efforts in Arizona border counties, especially in Yuma County where the rates are disproportionately high.

Poorly or not improving indicators

HIV. The rates of newly diagnosed cases of HIV have not improved in Arizona border counties since 2000. All four US border states routinely conducted surveillance of HIV and AIDS, and the major factors that influence HIV transmission in the border region have been examined. These factors included mobility and migration (33–35), injection drug use (36), and males who have sex with males and sex workers (34). Despite the similarities between the residents on both sides on the US–Mexico border, one study found a significant difference in the social and environmental factors that influence HIV risk and protective behaviors among intravenous drug users (36). These factors included mobility, migration history, homelessness, and individual behaviors. This suggests that, although binational collaboration is needed, different prevention approaches may be needed on either side of the border.

Infant mortality. Arizona border counties moved away from the target with respect to infant mortality from all causes, but the rate of infant mortality from congenital abnormalities declined or moved toward the HB 2010 target. In 2007, the Arizona border counties experienced a higher rate of infant deaths due to all causes compared with the 2000 rate for the respective border county. In the same year, Santa Cruz was the sole county with a lower infant mortality rate than the state. Public health campaigns aimed at increasing awareness among pregnant women of the benefits of taking folic acid supplementation before and during pregnancy as well as the folic acid fortification of grains were effective interventions for reducing birth defects in infants (37). Levels of awareness and consumption of folic acid by women have been measured at the national level; 81% of women aged 18–45 years reported awareness of folic acid in 2007 (38). Future studies should aim to measure the awareness and consumption levels in the Arizona border region with the goal of revealing factors that influence infant mortality rates from birth defects but not infant mortality rates from all causes.

Although the disparities in infant deaths among the border counties are apparent, this measure does not fully explain the infant mortality problem in Arizona. It is well documented that infant mortality occurs at disproportionately high rates in racial and ethnic minority groups in Arizona compared with non-Hispanic whites (39). In 2007, infant mortality rates were highest in African Americans, American Indians, and Hispanics; the death rate for African American infants was 4.7 times that of Asians and 2.7 times that of non-Hispanic whites (39). The infant mortality rate in the Arizona border counties (Cochise, 8.6; Pima, 7.2; Santa Cruz, 6.5; and Yuma, 7.4 deaths per 1 000 live births) appears to be representative of the 2007 statewide infant mortality rate for Arizona Hispanics (7.4 deaths per 1 000 live births).

The study design and data collection methods of the project had strengths and weaknesses. The availability of public-use data allowed for continued monitoring of the health outcomes and the HB 2010 objectives. Much of the data were readily available through the Arizona Department of Health Services Health Status Vital Statistics Annual Report or were obtained through web-based databases and reports.

The public-use data posed limitations in examination of the indicators and could potentially affect the ability of the general public to monitor the health status of their community. Not all data available to the public were directly comparable to the HB 2010 indicators. Deidentified and aggregate data were not always available for smaller geographic units or areas not heavily populated, as in the case of Santa Cruz and Yuma Counties and at times Cochise County. Especially in the case of rare health events, the data for these counties should be interpreted with caution given the small population sizes.

Where measures on the HB 2010 objectives were not available, proxies were at times available.[5] Proxies provided alternative but valuable information for the health areas of focus. However, comparisons with other border communities were no longer possible when proxies were used because of the unavailability of data by border county or differences in adjustments to the data. Monitoring the health status of populations allowed for the identification of health problems, but further research is needed to obtain information about the trends of the health indicators. Monitoring can lead to awareness and identification of major health issues with direct health care planning, programs, policy, and research.

This evaluation of the health indicators of the Arizona border counties provides a comprehensive description of the health status of the population. Infant mortality and HIV infection continue to be areas of concern in these populations. Further examination of the health disparities that occur among border residents is warranted. Additional efforts should focus on all the objectives even where progress is being made. Garza et al. examined the health status of the two border counties in southern California—Imperial and San Diego Counties (14). This report contributes to the knowledge base of the health status of Arizona border populations. Border community residents and health professionals can use this information in developing plans of action to improve health problems affecting them and the populations they serve.

[5] Proxy information was available in the Current Population Reports–US Census Bureau Organization (health insurance), National Immunization Survey (immunizations), ADHS AVRS (unintentional injuries, diabetes, and asthma hospital discharge rates), and Behavioral Risk Factor Surveillance System (BRFSS), Prevalence and Trends Data, Arizona 1999–2006 (oral health).

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RESUMEN

Situación de salud de los condados de la frontera sur de Arizona: examen a mitad de período del programa "Frontera saludable 2010"

Objetivo. La región estadounidense de la frontera entre México y los Estados Unidos consta de 48 condados distribuidos en cuatro estados, y las poblaciones que viven a uno y otro lado de la frontera tienen problemas de salud similares. El programa binacional "Frontera saludable 2010" está destinado a las poblaciones de la región y se propone mejorar la situación sanitaria en la frontera entre México y los Estados Unidos mediante actividades de promoción de la salud y prevención de enfermedades. Este estudio es un informe sobre la situación sanitaria de los cuatro condados de la frontera sur de Arizona.

Métodos. Los datos acerca de los indicadores de salud de los condados de Cochise, Pima, Santa Cruz y Yuma se obtuvieron del registro civil y estadísticas del Departamento de Servicios de Salud de Arizona. Se calculó el progreso mediante un porcentaje que refleja la cercanía o la lejanía del objetivo propuesto para el año 2010. Se compararon los datos correspondientes a los condados fronterizos con los del estado de Arizona.

Resultados. El progreso hacia los objetivos del programa "Frontera saludable 2010" no fue uniforme en los distintos condados fronterizos. Los cuatro condados lograron avances hacia los objetivos propuestos en materia de cáncer cervicouterino, hepatitis A y tasa de natalidad entre las adolescentes. La mayoría de los condados fronterizos están más próximos a cumplir con los objetivos en materia de cáncer de mama, mortalidad por diabetes, tuberculosis, colisiones de vehículos automotores, mortalidad infantil por anomalías congénitas y atención prenatal. Sin embargo, ninguno de los cuatro condados se está acercando al objetivo propuesto en cuanto al virus de la inmunodeficiencia humana y la mortalidad infantil.

Conclusiones. La evaluación de los objetivos del programa "Frontera saludable 2010" brindó una descripción integral de la situación de salud de la población. Aunque los condados de la frontera sur de Arizona han logrado avances en algunos aspectos, sigue siendo necesario mantener la vigilancia con el fin de detectar las disparidades aún presentes.

Palabras clave Programas gente sana; áreas fronterizas; estado de salud; salud fronteriza; Arizona; México; Estados Unidos.