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BORDER HEALTH 2012: BINATIONAL COLLABORATION TO DEVELOP AN OUTREACH ENVIRONMENTAL EDUCATIONAL PROGRAM

Genny Carrillo Zuniga, MD, ScD
Kirby C. Donnelly, PhD
Dora E. Cortes, MD
Eduardo Olivares
Hector Gonzalez, MD
Leslie H. Cizmas, PhD

The mission of the Border Health 2012 program is "to protect the environment and public health in the U.S.-Mexico border region, consistent with the principles of sustainable development."[1] Researchers from the Texas A&M Health Sciences Center School of Rural Public Health (TAMHSC-SRPH) in McAllen, Texas; the City of Laredo Health Department (CLHD) in Laredo, Texas; the Hidalgo County Health and Human Services Department (HCHHSD) in Edinburg, Texas; and the Universidad Autónoma in Nuevo León, México (UANL) partnered to conduct research addressing environmental health issues in the Texas/Mexico border region. The research focuses on understanding sources of exposure to pesticides and other chemicals that may affect the health of border residents. This article focuses on the collaboration among public health professionals to create an environmental education program that improves health awareness.

ENVIRONMENTAL HEALTH ISSUES AT THE BORDER

The border region of the Rio Grande Valley shares environmental, social, economic, and cultural similarities on both sides of the border. In addition, although the U.S. and Mexico operate under different policies, there are similarities in regulations on both sides of the border. As shown in Figure 1, the U.S.-Mexico border comprises 14 pairs of sister cities—cities that meet at the border of the U.S. and Mexico—that are linked economically, culturally, and in many cases environmentally (e.g., through shared waterways and airsheds).

Demography

As of 2008, the population of the border region numbered more than 11.8 million people, with 6.3 million living in the U.S. and 5.5 million living in Mexico. There are 26 U.S. federally recognized Native American tribes in the border region. Projected population growth rates in the border region exceed anticipated U.S. mean growth rates (in some cases by more than 40%) for each country. By 2020, the population is expected to reach 19.4 million.[1–3]

The U.S.-Mexico border is the most traveled border in the world. According to the U.S. Immigration and Naturalization Service, in 2002, more than 190 million people entered the United States from Mexico through 24 official ports of entry. Laredo is the number one inland port of entry, with more than 30% of the nation's imports (e.g., toys and sporting goods, electronic equipment, chemical products,[4] furniture and related products, textile products, and transportation equipment).[5] According to information published online by Economic Development America, in 2004, approximately 60% of the 500 million visitors admitted into the United States entered across the U.S.-Mexico border via 90 million cars and 4.3 million trucks.[6]

Environmental health

Environmental health is one of the most pressing problems in the border area.[5] Nine of the poorest counties in the United States lie along the U.S. side of the border. The United States and Mexico have spent millions of dollars building adequate water and wastewater infrastructure; to date, these improvements have impacted more than 6.7 million border residents. These infrastructure improvements not only enhance water quality, but also preserve shared waterways, prevent beach closures, provide safe drinking water, and

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Figure 1. Sister cities along the U.S.-Mexico border

San Diego (CA)—Tijuana	Douglas (AZ)—Agua Prieta	Eagle Pass (TX)—Piedras Negras
Calexico (CA)—Mexicali	Columbus (NM)—Puerto Palomas	Laredo (TX)—Nuevo Laredo
Yuma (AZ)—San Luis	El Paso (TX)—Ciudad Juárez	McAllen (TX)—Reynosa
Nogales (AZ)—Nogales	Presidio (TX)—Ojinaga	Brownsville (TX)—Matamoros
Naco (AZ)—Naco	Del Rio (TX)—Ciudad Acuña	

protect human health.[7] In many ways, the environmental problems found on the border are among the most extreme faced by either Mexico or the United States today.[8]

Border environmental health problems include air quality (particulate and organics), water quality and quantity, lead exposure, and improper waste disposal.[9] Water is the most precious resource in a large portion of the border region, which is primarily arid. In addition, air pollution ranks among the worst environmental problems: particulate matter levels continue to exceed standards during peak events, and several studies have suggested that asthma and other respiratory problems may be elevated in the region.

Rural communities along the border face a variety of environmental problems,[6,9] one of which is exposure to pesticides used in agricultural activities.[10,11] Although pesticides are important for increasing crop production and reducing disease vectors, large segments of the rural population may be exposed to emissions from commercial and domestic chemical use. Pesticide contamination poses a greater threat to areas with a high concentration of farming, such as the Imperial Valley and the Rio Grande Valley. Programs monitoring human exposure are scattered and not coordinated.[2] If rapid population growth persists as predicted, it will have an enormous impact on the environment.

COLLABORATIVE RESEARCH

One way to counteract these environmental health issues is through cross-border collaboration. TAMHSC-SRPH, UANL, HCHHSD, and CLHD have joined forces to discuss specific environmental issues unique to the U.S.-Mexico border. This group decided to focus on the environmental education field and agreed that pesticide education was an important issue to follow on both sides of the border.

U.S.-MEXICO BORDER 2012

The U.S.-Mexico Environmental Program (called Border 2012) involves collaboration among agencies in the United States and Mexico. They include the 10 border states (California, Arizona, New Mexico, Texas, Baja California, Sonora, Chihuahua, Coahuila, Nuevo León, and Tamaulipas), U.S. tribal governments, the U.S. Environmental Protection Agency (EPA), Mexico's Secretariat of Environment and Natural Resources, the U.S. Department of Health and Human Services, Mexico's Secretariat of Health, and other federal agencies.

The overarching goal of the Border 2012 program is to protect the environment and public health in the U.S.-Mexico border region. Specific goals include: (*1*) reducing water contamination, (*2*) reducing air pollution, (*3*) reducing land contamination, (*4*) improving environmental health, (*5*) reducing exposure to chemicals as a result of chemical releases and/or acts of terrorism, and (*6*) improving environmental performance through compliance, enforcement, pollution prevention, and promotion of environmental stewardship.[1,4] Issues and projects are identified and implemented at the local level, and the program encourages stakeholder involvement through a variety of opportunities, such as collaboration among academia, local health departments, and community organizations.[3]

Public health interventions are developed and implemented among federal, state, local, and U.S. tribal agencies to reduce exposure to environmental contaminants and to alert residents to possible environmental exposures. Environmental education and training is critical for long-term environmental protection. Development of educational programs and training efforts foster community awareness and engagement with environmental issues targeted to each community.

Figure 2 shows the border regional workgroups. Their activities include: (*1*) identifying and prioritizing regional environmental issues, (*2*) recommending issues beyond regional scope to be addressed by border-wide workgroups and/or policy forums, and (*3*) working with border-wide bodies to address those issues. Border-wide workgroups concentrate on issues that are multiregional (identified as a priority by two or more regional workgroups) and primarily federal in nature (requiring direct, high-level, and sustained leadership by federal program partners in the U.S. and Mexico).[4]

Border-wide workgroups have broad-based stakeholder participation and include nongovernmental and community-based organizations; academic institutions; local, state, and tribal representatives; and binational organizations from both countries with expertise in the given workgroup's subject area.

In the past three years, Border 2012 funds implemented 22 projects throughout the border region to assess surface water quality, protect shared waterways, gauge the effectiveness of innovative wastewater-treatment technologies, and provide training to border residents, municipal workers, and others on water system upkeep and basic sanitation practices.[6]

Approximately 30% of the water projects focus on building capacity along the border, which includes training wastewater utility operators and developing a wastewater database. Education and outreach efforts comprise about 15% of the projects, including a watershed education program in California-Baja California, in which trained bilingual educators are teaching more than 500 students about watershed protection, monitoring, and public health.[6]

To address the drinking water needs in Texas's *colonias* (residential areas along the Texas-Mexico border that may lack some of the most basic living necessities, such as potable water, sewer systems, electricity, paved roads, and safe and sanitary housing), El Paso's *Centro de Salud* trained *colonia* residents in proper water purification techniques and distributed environmental health information. The Rio Grande, a natural boundary dividing the two nations along the Texas-Mexico border, stretches for more than 1,200 miles. Both nations draw from its waters to serve agricultural, industrial, and drinking water needs, making its use, protection, and sustainability extremely important.

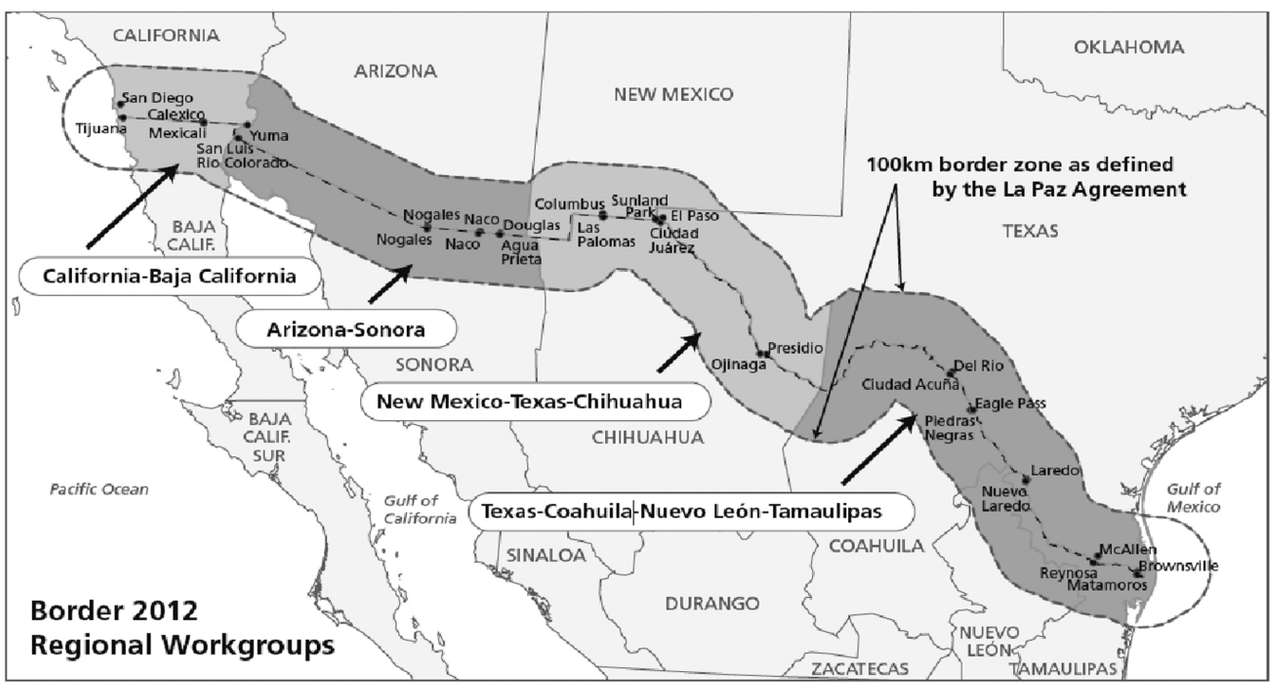
Most of the region's universities on the U.S. and Mexico sides of the border have collaborative outreach, education, and research programs concerning the environment. The EPA Border 2012 website describes 22 such projects in greater detail.[3]

INTERNATIONAL COLLABORATORS

TAMHSC-SRPH

Four institutions partnered to work on one outreach study related to education on pesticides. TAMHSC-SRPH expanded its presence in the Lower Rio Grande Valley by establishing the South Texas Center (STC) in McAllen. Through the STC, TAMHSC-SRPH and other components conduct research on border health issues and provide education to health professionals and outreach programs to disadvantaged populations.

Figure 2. Border 2012 regional workgroups



Source: U.S. Environmental Protection Agency

UANL

Established in 1933, UANL is a state-funded institution located in Nuevo León, México, at the northeast region of the country bordering the Mexican states of Coahuila and Tamaulipas, as well as Texas. The UANL has the core mission of forming technicians, professionals, professors, and researchers, as well as performing and fostering scientific research in its basic and applied forms, taking into account both regional and national problems (including the border region).

HCHHSD

The HCHHSD in Edinburg, Texas, oversees 700,634 inhabitants in the county. Public health services offered to the county include: assuring sanitation; providing immunizations, family planning services, and prenatal care; improving nutrition; and conducting restaurant inspections. The agency is faced with multiple challenges, including issues related to obesity, tobacco use, injuries, lack of immunizations, and lack of access to adequate health care for all citizens.

CLHD

The CLHD is committed to providing culturally competent quality services for disease control, preventive health, and public health emergency preparedness to ensure a healthy and safe environment for Laredo/Webb County, as well as Jim Hogg, Zapata, and Duval counties in Texas. CLHD serves more than 225,000 people annually and has a long history of meeting the region's public health needs. To further ensure appropriate public health response, there is an intimate coordination with the sister city of Nuevo Laredo and its health officials for disease control and prevention.

ENVIRONMENTAL HEALTH EDUCATION PROJECT

The collaborative program among TAMHSC-SRPH, UANL, and local and state health departments is designed to empower rural and underserved families with information needed to improve their health in *colonias* in Laredo and Colombia, Nuevo Leon, Mexico. We hypothesized that the delivery of health education to these families would improve their understanding of environmental factors that affect health, reduce chemical exposures, and ultimately lower the incidence of disease.

During the past three years, the program has addressed three educational priorities. First, to address community issues, the project delivered health education materials to approximately 250 families in two communities. Second, to address the health priority issue, several training sessions were conducted with lay health workers (called *promotoras*) from a broader group of communities. Finally, existing data have demonstrated that a significant segment of the children in these communities falls into the 90th percentile of exposure compared with children across the U.S.[5,6] These communities are 98% Hispanic and are defined as low-income and culturally diverse communities affected by the issue of environmental justice.

The health education program was designed to take place in four stages:

1. In the first stage, TAMHSC-SRPH investigators from the Community Outreach and Education Program would meet with the community to discuss their environmental concerns. At the completion of the initial meeting with the families, a survey would be completed by each family to identify and rank their major concerns with regard to environmental health.
2. In the second stage, educational modules would be developed (or modified from existing modules) in a bilingual format for each area of concern identified by the families. These modules would be reviewed by *promotoras*, who would also be trained to deliver this information to the families.
3. The third stage would involve house visits during which the *promotoras* deliver the information to the families and conduct pre- and posttests of their knowledge of the subject.
4. In the fourth stage, assessment tools would be used to measure knowledge retention (a one- and three-month test) and behavioral changes. The project would also include clinical measurements (e.g., urinary elimination of pesticides by children) as an indicator of the utility of the health education material.

The goal of this program was to empower the individual families to improve the health of their children. The preliminary results from these communities have demonstrated a significant improvement in knowledge following the administration of health education.[11] However, the investigators realized that the content of some of the items on the knowledge assessment will need to be revised. For instance, the more simple questions were answered correctly by most of the population (ceiling effect), with little variance on these items found. Also, some questions were a bit confusing, making it difficult for the sample population to answer both at the pre- and posttests. Follow-up for those families and a posttest to confirm the knowledge obtained are planned in the near future.

DISCUSSION

Challenges and recommendations

Binational partnerships to improve the quality of the environment and human health have been implemented through the U.S.-Mexico Border 2012 program. These partnerships create diverse opportunities for increasing knowledge and improving the quality of the environment on both sides of the border. TAMHSC-SRPH, UANL, and the participating health departments have been collaborating for many years on activities to improve health in border populations. A key element to the program's success has been the willingness of all partners to share information and work together to resolve the many problems that are encountered when conducting binational studies.

Among the greatest challenges for U.S. researchers has been gaining the families' trust on both sides of the border prior to implementing a research program. When a family is approached to participate in a health education or exposure study, it is important to clearly communicate the study's goals and schedule to the family. *Promotoras,* who in most cases are community members or community health workers who are well-known by the families, are essential for facilitating communication with the families. The *promotoras* also improve the cultural accuracy of the health education material and greatly enhance the quality of research conducted in these communities.

Due largely to support from the *promotoras* in this study, the overall retention rate of participants in the research projects during the past 10 years has been more than 90%. In most cases, the participants who have been lost from research studies have been families that left the area. In addition, because of the trust gained through the use of *promotoras,* many of the families have helped to recruit new participants as new studies have been developed.

Lessons learned

The program has led to some valuable lessons in how to successfully manage a collaborative project. For one, binational research requires collaboration among many different organizations. For another, *promotoras* can enhance both the quality and quantity of research that can be conducted in a community. And while health education is a useful intervention for border communities, assessments are also an important tool for evaluating their success.

CONCLUSION

State and federal governments in the U.S. and Mexico support a number of programs to increase collaboration and improve the health of populations living in the border region. The Border 2012 program is designed to address important environmental and health issues in border communities. The collaboration described in this article among families in border communities, *promotoras*, TAMHSC-SRPH, UANL, the Texas Department of Health and Human Services, and the City of Laredo and Hidalgo County health departments will continue work to prioritize problems and develop interventions. In our experience, these families have welcomed us and been remarkably receptive to the various interventions that have been piloted in their homes. Future intentions are to expand these activities to other communities and to continue the evaluation of health education modules.

Genny Carrillo Zuniga is an Assistant Professor and Kirby Donnelly is a Professor and Head of the Department of Environmental and Occupational Health, School of Rural Public Health, Texas A&M Health Sciences Center in McAllen, Texas. Dora Cortes is a faculty member at the Universidad Autónoma in Nuevo León, Mexico. Eduardo Olivares is the Chief Administrative Officer at the Hidalgo County Health and Human Services Department in Edinburg, Texas. Hector Gonzalez is the Health Director at the City of Laredo Health Department in Laredo, Texas. Leslie Cizmas is a Research Assistant Professor at the Department of Environmental and Occupational Health, School of Rural Public Health, Texas A&M Health Sciences Center.

Address correspondence to: Genny Carrillo Zuniga, MD, ScD, Department of Environmental and Occupational Health, School of Rural Public Health, Texas A&M Health Sciences Center, 2101 South McColl Rd., McAllen, TX 78503; tel. 956-668-6321; fax 956-668-6302; e-mail <gcarrillo@srph.tamhsc.edu>.

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