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## Environmental Justice and Community-Based Participatory Research in Texas Borderland Colonias

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### Abstract

**Objective**—An innovative academic-community partnership studied daily decisions in communities of mostly Spanish-speaking, low-income residents of colonias in Hidalgo County, TX, about risk of exposure to fish contaminated by PCBs at an Environment Protection Agency (EPA) Superfund site.

**Design and Sample**—The team used focus group interviews with colonia residents and content analysis to assess knowledge of risk related to the Superfund site, the Donna Reservoir and Canal System.

**Results**—(1) many lacked knowledge of the Superfund site contamination; (2) a few participants fished at the lake, knew people who did so, and consumed the catch, but most participants feared going there; (3) some participants remember receiving messages saying not to fish at the site, although they recalled nothing about contamination, but most participants knew of no such messages; (4) many use cell phones to get local information through personal networks and several Spanish-language news sources, but they have no consistent, culturally tailored local information source.

**Conclusions**—The findings indicate the need for further efforts to design culturally tailored means of communication and messages to inform local communities widely about the dangers related to the Superfund site and thus decrease health disparities resulting from consuming fish from the site.

### Keywords

Environmental contamination; public health messaging; Hispanics; PCBs; Superfund; US-Mexico Borderlands

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## Background and Research Questions

Polychlorinated biphenyls (PCBs) belong to a family of organic chemicals known as chlorinated hydrocarbons that present widespread environmental justice concerns. PCB manufacture was banned in 1979 due to toxicity to immune, reproductive, endocrine, and nervous systems of humans and animals (Abass et al., 2013; Porterfield, 1994; Ropstad et al., 2006). The more than 200 PCB congener mixtures vary in toxicity and organ systems affected, thus carrying different health risks, complicating environmental health studies. PCBs were formerly widely used in electrical transformers, pesticides, plastics, and other products (U.S. Environmental Protection Agency (US EPA), 2014a, b). Found worldwide in surface waters, they tend to combine with suspended particles, fall to the bottom, and enter the food chain through small organisms eaten by fish (Agency for Toxic Substances and Disease Registry, 2011). Eating fish from contaminated sites exposes people to a wide variety of health risks.

Designated by EPA as “probable human carcinogens,” PCBs are associated with non-Hodgkin's lymphoma, prostate cancer, and in some cases, possibly breast cancer (US EPA, 2013a,b; see also Charles et al., 2003; Charlier et al., 2004; Demers et al., 2002; Diorio et al., 2013; Engel et al., 2007; Holford et al., 2000; Recio-Vega et al., 2011; Stellman et al., 2000). Exposure pre-pregnancy and in utero has been associated with developmental disorders and cognitive deficits in infants and children (Jacobson and Jacobson, 1996), and such problems were seen in the region of this study in the early 1990s (Texas Department (TDSHS), 2007, 2010).

PCBs are also implicated in diabetes, which has an exceptionally high prevalence in the region (Silverstone et al., 2012; Lee et al., 2006; Fisher-Hoch et al., 2012). “Self-reported diabetes” has been found to be significantly associated with serum PCBs including the forms most common in our study, Aroclors 1240 and 1260 (Philibert et al., 2009). A Monsanto plant produced PCBs in Anniston, Alabama, for decades and those most affected were working-class African Americans living near the plant (Spears, 2014). The people in our study similarly belong to a low-income, ethnic minority population living near a Superfund site and also have poor access to health information and healthcare services.

### Research Focus

This study deals with health disparities related to a Superfund site, Donna Reservoir and Canal, known locally as Donna Lake. The site includes a 400-acre irrigation and drinking water reservoir fed by a canal from the Rio Grande River in Hidalgo County, a region with

numerous *colonias*, which are rural neighborhoods with poor infrastructure inhabited by the Mexican American working poor. PCB levels in fish from the lake are at unacceptably high levels; one fish had an extremely high level of 399 ppm, and a sample of the lake's fish had an average of 1.516 ppm, outstripping the EPA limit of 1.4 ppm (Texas Department of Health, 2004; TDSHS, 2006, 2010).

The EPA listed Donna Lake and canal as a Superfund site and placed it on the National Priorities List in 2008 (US EPA, 2012, 2014c). A ban on possession of fish was imposed and continues today while the EPA searches for the PCB source at the site. Vigorous campaigns through the mail, door to door, in fliers and at public meetings warned against consuming the fish in 2009 and 2011 in the City of Donna and in 2012 in the City of Alamo, the two cities closest to Donna Lake and surrounding rural areas (US EPA, 2014c). A number of signs have been posted by EPA and the Texas Department of State Health Services in two waves, but many were removed immediately and graffiti defaced many of the others in rapid order.

Even though the campaigns went far beyond the traditional “no fishing advisory,” catching and consuming fish continues. We expect that this problem contributes to health disparities, leading us to launch this environmental justice project as a first step in addressing risks to the colonia population. Our research questions were: (1) What do residents of local colonias know about the risks of eating Donna Lake fish? (2) Do colonia residents use Donna Lake for fishing and do they eat or sell the catch? (3) How do colonia residents get information and alerts about local health problems?

## Methods

### Design and Sample

The study held focus groups to gather qualitative data on colonia residents' perceptions of risk associated with Donna Lake. *Promotoras de salud* (community health workers) were hired to advise on and implement the project; the lead promotora was a longtime colonia resident adept at building rapport and incorporating the voices of colonia communities.

Nearly all of the research team was bilingual in Spanish and English. All written materials given to the participants (consent forms, sociodemographic survey) were in both languages. A primary researcher translated materials and several others edited the work. The bilingual skills of the research team is one of the strengths of this project, as most colonia residents prefer to communicate in Spanish.

The promotoras recruited participants through community word-of-mouth and snowball sampling. Inclusion criteria were living in a colonia, self-identification as Mexican or Mexican-American, age of 18 years or more, and granting consent for data collection. IRB approval was obtained from the University of Texas Health Science Center in San Antonio, the University of Texas-Pan American, and Texas A&M University Health Science Center. All academics and the lead promotora had certified CITI training; another promotora received standardized IRB training.

The focus group methodology is an exploratory means of data collection on a topic that is not well understood (Krippendorf, 2013). Focus groups are also useful in participatory research to engage with people to solve a community problem (Krueger & Casey, 2000). Focus groups provide a method for eliciting different views from community members in a socially supportive, nonjudgmental setting (Fernandez et al., 2006; LeCompte and Schensul, 1999). This method has the advantage of allowing people to respond to questions in their own words and engage in spontaneous discussions with their peers. Also, the method allows data collection in a relatively short time.

In total, five focus groups were conducted to reach content saturation (Krueger & Casey, 2000). Four were at participants' homes and one at a local community center. The groups had between six and nine participants each. Many group members already knew each other as neighbors or from community center activities. Participants spoke in their language of choice, which was Spanish in nearly all instances, and the promotoras asked questions in Spanish or both Spanish and English depending on focus group composition. Focus group meetings took sixty to ninety minutes. Childcare, small gifts of fresh fruit, bottled water, bilingual children's books, and hygiene kits were provided to participants.

## Measures

A nine-question, sociodemographic survey was completed by each participant at the beginning of each focus group. The promotoras utilized a script of twenty-three questions beginning with broad exploration of the participants' familiarity with Donna Lake and leading to more specific questions about fish consumption, PCBs, and health information access. Each focus group was recorded with multiple devices and several researchers were present at each session to record field notes and observations. The audiorecorded interviews were transcribed verbatim into Spanish or English depending on the language spoken by the participant. The team member responsible for the initial transcription turned over her work to a second team member who listened to the recordings and made note of any discrepancies, resolved through discussion.

Additional interviews were conducted with key agency staff of the EPA and Texas DSHS about their efforts to educate the public in the surrounding communities. The research team visited Donna Lake to make unobtrusive observations of people fishing in the lake and to learn about the work of the EPA project manager coordinating the Remedial Investigation and Feasibility Study (US EPA, 2014c).

## Analytic strategies

Sociodemographic data were summarized to see how well the participants represented the colonia population. The focus group transcriptions were discussed among project team members and organized by narrative themes according to the project's specific aims and research questions. As noted by Krippendorf, "a simple descriptive narrative is quite appropriate and is often all that is necessary" for the analysis of focus group data (2013, p. 115). One researcher wrote the initial data analysis followed by review and discussion by additional team members, who analyzed focus group transcriptions using constant comparison and other content analysis. The analysis also drew on the field observations of

the researchers and promotoras and on the history of health education efforts by EPA and Texas DSHS agency staff.

## Results

A total of 35 women participated. They were relatively young and most had a low educational level (Table 1). Nearly all participants began school in Mexico; this variable indicates immigration status. Spanish was the language favored for communication at home, and in reading skills, 97.1% reported ability to read Spanish while only 23.5% noted ability to read English.

On average, they had lived in their colonias for almost 6 years ( $5.9 \pm 4.5$  years with a range from 1 to 20 years). Participants living in the Donna city region accounted for 82.9% of those in focus groups, and 17.1% lived around the city of Alamo. In relation to the public health campaigns on Donna Lake fish contamination, 85.7% of the participants living near Donna had resided in their current colonia during the 2011 campaign and near Alamo, 66.7% had lived there during the 2012 campaign.

Comparison of participants with those in a larger, previous study with 208 colonia participants reveal similar sociodemographic characteristics (Table 1, column 2). The county as a whole is similar in that 91% of the county population is Hispanic and 84.5% speak a language other than English at home. The county poverty rate is 34.3% in a population of 815,996 (U.S. Census Bureau (Census) 2013a). Compared with focus group members, adult women in the county population have more education: 23.1% of adult women had completed high school and 38.3% had post-secondary education (Census 2013b). A smaller percent of county population had immigrated from Latin America, 27.62% (ibid.).

### Findings Related to the Research Questions

**1. What do residents of local colonias know about the risks of eating Donna Lake fish?**—The majority of the participants knew the location of Donna Lake, but almost all identified it as an isolated area that they avoid. Some participants had never heard of it, even though they lived fairly close by. Many reported knowing the reservoir was contaminated but were unable to identify the source of contamination. A few in two focus groups attributed the contamination to people using the reservoir as a dump to discard many kinds of unwanted items and even dead animals. Many participants who were aware of the reservoir's contamination identified the water, instead of the fish, as contaminated. Participants in one of the focus groups reported receiving information regarding the contamination from schools and the municipal water department who suggested they boil the water before consuming it (such advice would not clean PCBs from water). None of the participants reported hearing or seeing any information about Donna Lake from the EPA, and none knew of it as an EPA hazardous waste site.

A few participants in each of the focus groups knew of the fishing ban at the lake, but attributed it primarily to state regulations requiring fishing licenses. They said residents were afraid of being fined if they were caught without a license. As one participant said

Rules were given to people who wanted to go fishing. To begin with it was against the law....If we knew of someone fishing there, we were told to report them. There was a phone number provided, where to report it. And [we were told] that the people who caught fish from there could not eat it because the fish was contaminated.

Two participants reported fishing regularly in the past few years, and even though they had seen the signs banning fishing, they were unable to read them because of graffiti, poor maintenance, and unwillingness to read such a long explanation. As one participant said, “It cannot be read. It is very ugly because the words are obscured by spray paint and graffiti.”

One participant recalled reading “something” regarding the contamination on the back of the water bill a couple of years ago, but since it was in English, it had to be translated by a relative. She reported that it concerned small canals, not the reservoir in particular. Participants also reported only looking at the amount due on their bills and not reading the special messages on the backs of their bills as they are in English.

Finally, in another example of different perceptions, one of the participants thought that the fishing restrictions were because Donna Lake was part of the Lower Rio Grande Valley National Refuge, located nearby. The canal leading from the Rio Grande River to the lake is also contaminated with PCBs, and participants did not know of the canal or the layout of the irrigation system.

**2. Do colonia residents use Donna Lake for fishing and do they eat or sell the catch?**—The focus groups revealed that Donna Lake is used for recreation and fishing with both commercial and informal redistribution of fish. Participants said people in the community like to fish for recreational purposes, including fishing for sport (“we like to fish,” “my husband's family really likes fishing,” “many fish for sport”). A few participants also talked about eating fish from Donna Lake that their husbands or friends had caught and shared with family and friends. One participant talked about limited access to a certain type of fish in the local supermarket and the availability of this particular fish in Donna Lake. Observations of participants also indicate that for some time, many have been aware that people fish for the purpose of selling their catch in the community and at the local markets.

**3. How do colonia residents get information and alerts about local health problems?**—The majority of participants had mobile phones, including basic cell phones and some smartphones with internet connectivity. Many reported that cell phone service to their neighborhoods was spotty. When asked how they got messages, many residents said that they “get on the Internet” and also receive information from “neighbors, news broadcasts, Facebook or by texting” and several use smartphones to stay in touch with relatives living far away. All participants reported listening to or watching one of several local Spanish language news broadcasts (e.g., Noticias 48).

Variability is much greater in direct person-to-person communication within colonias relative to how messages are received, including health messages. One of the five colonias has a local “neighborhood watch” group; one participant said that residents in her colonia “get together on Monday and we tell each other about what happened over the weekend”



including any health-related messages. However this mechanism for relating information is not consistent throughout colonias. One focus group reported being unable to sustain a neighborhood watch group because some residents expected to receive incentives for attending meetings. In another case, neighborhood watch meetings were cancelled after a political scandal at the sheriff's office interfered with local law enforcement service. All focus groups reported that colonias can be dangerous, need regular monitoring, and are only patrolled erratically. Despite living relatively close to one another, people in colonias report that they "mind their own business" and do not interfere with their neighbors as a way to prevent gossip or inadvertent involvement in illegal activities.

Nobody wants to get in trouble for pointing fingers. I do not want to know much about my neighbor and I don't want her to know much about me. If you get too involved with them no, no, no. It happened to me already and I say, no. A greeting of 'good morning' is enough.

While cohesive neighborhood networks are somewhat unusual, people do pass along information and alerts (e.g., Amber Alerts) to others in their neighborhoods under potentially life-threatening circumstances. When storm and hurricane warnings are issued, people pass the word to each other. The exception was one colonia that had no system of communication about suspicious activity in their neighborhood. These participants reported sharing information only when absolutely necessary and keeping a distance from neighbors as the general rule.

Colonia residents also are aware of written information on a broad range of topics available from community centers and clinics, but they report that they do not often read it. They explain that some fliers are written in English only and others may be written in Spanish but at a level difficult to understand. Participants also said that community centers themselves are not always accessible; some are located 20-25 minutes away from their homes by car, limiting the amount and frequency of information exchanged.

Various kinds of communication are available to them but in limited ways, and participants report that they lack access to valuable information. They said that even upon request, public officials and safety officers do not give their communities much attention. One focus group reported that the local school district was a good source of information about school-related activities. Participants said the fish-ban signs posted along roads and on the banks of Donna Lake are avoided because they do not want to stop by the side of the road to read a sign and thus, draw attention to themselves. They fear they will be questioned by law enforcement or spotted by people engaged in illegal activities.

## Discussion

The researchers used methods to examine understandings about PCB exposure risk from fish among low-income Hispanic colonia residents who live near Donna Lake, a Superfund site. Focus group comments show that despite English/Spanish signage that bans fishing at the lake and vigorous public health campaigns by federal and state agencies, most residents had poor understanding of the exposure risk. The statements of those participants who knew about the lake reveal an awareness of a problem, but most did not know about PCB

contamination of the fish. This supports the findings from Hewitt, Candek, & Engel, (2006); McCurdy et al., (2004) that there is a paucity of information and best practices on how to educate about a variety of environmental exposures on health as well as how to manage and communicate the risks.

This study finds that major problems come from community misunderstandings of why the ban is in place. Community education campaigns in 2009 and 2011-13 did not reach colonia residents effectively despite the use of different lines of communication and methods. The lack of community awareness may be related to a colonia characteristic of compromised relationships between service providers and residents with inadequate translation, lack of trust, mutual suspicion and the sense that the “other side is trying to hide something or pulling something over” (Earle, 1999). This suspicion and lack of trust is compounded by the lack of infrastructure support that is characteristic of colonias.

Limitations of this study include the use of convenience sampling, meaning that results cannot be generalized beyond this sample. An attempt was made to overcome this limitation by having five focus groups recruited from colonias scattered through the region of Donna Lake, and the demographic comparison with a larger study of colonia residents shows that the participants typical. A second limitation is that the participants in the focus groups may have had different opinions from other colonia residents, contributing to potential response bias. Although we found that participants generally enjoyed getting together for a focus group meeting, we were aware, nonetheless, that individual differences tended to be muted by the focus group method, as local Mexican American culture emphasizes harmony, politeness, and smooth social relations. The tendency to hide disagreement was partly counterbalanced by including multiple focus groups and partly by the atmosphere established by the promotoras, who encouraged all participants to speak up.

It is clearly evident from this study that there are some trusted ways and methods that colonia residents do get information. The focus groups revealed that the vast majority of participants had mobile phones, many with internet access. This is consistent with current trends; according to the Pew Hispanic Research Center (2013), 86% of Hispanics say they own a cellphone, a share similar to that of non-Hispanic whites (84%) and blacks (90%). Among adults, Hispanics are just as likely as whites or blacks to own a smartphone, 49% versus 46% and 50% respectively. In addition, Hispanic internet users are more likely than white internet users to say they go online using a mobile device, 76% versus 60%.

A study by Anderko et al. (2013) suggested that web-based media is a flexible, engaging method to communicate effectively about environmental health issues to health professionals. Our study demonstrated that colonia residents do use their mobile phones in a variety of ways (calling, texting, searching the internet) to get information. Thus, employment of cellular and smart phone technology is an additional communication method that needs to be explored in developing reliable, culturally tailored multimedia strategies within this community.

For public health nurses, this study underscores the importance of community participation in developing risk messages. This study agrees with Wardman (2008), which encouraged the

risk dialogue approach to motivate “participation of citizens and other stakeholders in risk-related debate and decision making” (p. 1627). This approach calls for both senders and receivers of critical health messages to collaborate when developing risk education campaigns while addressing participant insights and divergent social realities. Although reaching community consensus can be costly and demanding, community-based approaches can lead to greater adherence to risk messages by the population served (Jardine, 2003). The low literacy of colonia residents means that handouts and signs with detailed, technical explanations in either English or Spanish are not good means of communicating health messages. The findings also indicate that community members cannot rely on each other for passing on information about health risks.

An additional implication for public health nurses is the understanding that the key to the success of this project was the Spanish-speaking promotoras who participated in all phases of the research. It was vital that they could guide the development of questions in appropriate phrasing, develop rapport, express themselves in the local Spanish idioms, and gain enough trust to elicit valuable information in the focus group meetings. The success of this method is consistent with other work by some of the researchers (Millard et al., 2011) and it will continue to be used in later phases of this pilot work.

A notable finding of this study is that residents, while generally being aware that there was a concern about Donna Lake, lacked an understanding of the PCB exposure risk despite it being present in signage and other written forms of communication sent to their homes. This research approach, working with focus groups and promotoras, succeeded in giving voice to the community and engaging their attention to a crucial health threat.

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**Table 1**

## Sociodemographic characteristics

	<b>Mean ± s.d. (Range) or Percent</b>	
	<b>Focus Group Participants</b>	<b>Comparison Study</b>
Age (years)	33.4 ± 7.1 (20 to 51 yrs.)	35.4
Education	9.0 ± 5.9 (3 to 15)	
Elementary school	27.4%	35.6%
Completed middle sch.	44.7%	30.8%
Completed high school	20.7%	17.8%
Post-secondary education	6.8%	6.2%
Where began school: U.S.	5.7%	11%
Mexico	94.3%	89%
Language spoken at home		
Only Spanish	79.4%	81.4%
English & Spanish equally	8.8%	6.9%
More English than Spanish	0.0%	1.6%
Reading skills: read Spanish	97.1%	96.3%
Read English	23.5%	23.7%