

## Residential Perceptions of Environmental Exposures and Associated Health Effects in the Fresno, Texas, Community

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### Abstract

**Background:** Environmental contaminants are often located in areas heavily populated by African Americans, Hispanics/Latinos, and the poor. In many communities, the discovery of environmental hazards occurs following concern and investigation by its constituents. The residents of Fresno, Texas, which is a predominantly minority community located near Houston, Texas, have long-standing undocumented concerns related to potential environmental exposures and associated health effects. To begin to document the concerns of the members of the Fresno community, we used focus group methodology to examine the resident's perceptions of the environment in the Fresno community, potential routes and sources of environmental exposures, and how Fresno residents perceived that these environmental hazards could affect their health. **Methods:** Focus group methodology was used to assess the Fresno communities' perceptions of environmental exposure, perceived routes of exposure, and perceived adverse health affects. Nineteen Fresno residents took part in four focus group discussions that were recorded, transcribed, and analyzed using content analysis. **Results:** The residential participants overwhelmingly described poor water quality in the Fresno community. While some residents perceived that the air quality was good or clear, others described the air as poor or potentially dangerous. Some residents identified the local chemical companies, a landfill, chlorination, and a lack of public water supply as potential sources of contamination in the Fresno community. The residents perceived that environmental exposures could potentially affect their health status, in particular the drinking water. **Conclusions:** The findings of our study convey the concerns of the members of the Fresno community. Potential environmental exposures were identified along with sources of environmental hazards. Although there were differing perceptions of air quality, the perceptions of water quality and sources of contamination were consistent. These findings should be used in developing a larger-scale environmental health assessment in the Fresno community to examine self-reported health status and measure contaminant levels in the residential drinking water.

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### Introduction

Minorities, as well as underserved and economically disadvantaged populations, are disproportionately exposed to environmental contaminants. Environmental activists were the ones who initially drew attention to this unequal burden of environmental exposures in communities of color and lower socioeconomic status. (Brown, 1995; Northridge, Stover, Rosenthal, & Sherard, 2003). Subsequent reports

and studies that focused on environmental exposures and equity also revealed that the racial and ethnic composition of a community affects its level of environmental hazards. These studies have demonstrated that hazardous waste landfills and uncontrolled toxic waste sites are more likely to be located in low- and middle- income African- American and Hispanic/ Latino communities (Institute of Medicine, 1999; Lee, 2002; United Church of Christ, 1987).

The health disparities often observed in minority and disenfranchised communities have increasingly been attributed to environmental and social factors. Therefore, when designing studies to examine environmental exposures in minority communities, it is important to use a holistic approach, in which members of the targeted community help define community factors and outcomes (Israel, Parker, Rowe, Salvatore, Minkler et al., 2005; Israel, Schulz, Parker, and Becker, 1998; Jones, Chilton, Hajek, Iammarino, and Laufman, 2006; Payne-Sturges, Gilbert, Crowder, Hurley, Lee, Morello-Frosch et al., 2006). In recent years, community members have successfully partnered with researchers to combat environmental nuisances by using community-based participatory research (Israel, 2005; Schell, Ravenscroft, Cole, Jacobs, Newman, and Akwesasne Task Force on the Environment, 2005; Schulz, Kannan, Dvonch, Israel, Allen et al., 2005; Shepard, Northridge, Prakash, and Stover, 2002; Lipscomb, Argue, McDonald, Dement, Epling et al., 2005; O'Fallon and Dearth, 2002; Srinivasan and Collman, 2005; Swartz, Callahan, Butz, Rand, Kanchanaraksa et al., 2004).

Community-based participatory research is an approach that allows the community, which is recognized as an equitable partner in the research process, to identify a research topic that is relevant to it (Israel, 1998; Israel, Schulz, Parker, and Becker, 2001; Wallerstein and Duran, 2006). With this approach, research questions are guided by the concerns of the targeted community. This is important because community members are the experts on the environmental problems they face, and most cases of widespread environmental contamination are initially revealed by them (Brown, 2003).

Qualitative research techniques are not commonly used in environmental health research, yet they can be a valuable and descriptive source of data. More specifically, qualitative research techniques such as focus groups can play an important role in understanding how communities perceive potential environmental exposures and their associated adverse health effects. When

designing community-based studies, it is important to develop research projects, more specifically interventions, based upon the questions and concerns most relevant to community members. Therefore understanding the communities' perception is vital to developing the defined research questions and understanding the problems faced by the targeted community.

In a previous study assessing environmental health, residents and key officials voiced concerns about potentially harmful environmental exposures in the Fresno community (King, Hernandez-Valero, Chukelu, and Jones, 2006). Fresno, Texas, is an unincorporated, rapidly growing community with undocumented environmental concerns. Until now, the potential sources of environmental exposure and their associated adverse health effects have not been identified. Fresno consists of Hispanic/Latinos (49.9%), African-Americans (26.5%), and white non-Hispanics (21.6%), and of the 6,603 residents, approximately 15% are ranked below the poverty level (United States Census Bureau, 2000). Fresno is a good candidate for an environmental justice study, given its demographic profile; its proximity to a Superfund site, a landfill, and an airport; and its long-standing concerns about environmental exposures (King, 2006).

A public water supply has not been established for many of the residents of Fresno, and the quality of water in the area is of great concern. Private shallow water wells and septic systems must be installed for drinking water and waste removal. Improper installation or maintenance, as well as, lack of water wells or septic systems may increase the risk of environmental exposure and associated adverse health effects in this community. Fresno residents who obtain drinking water from a municipal utility source in recently developed neighborhoods have also voiced undocumented concerns about the potential for contamination of their water supply. Additionally, the releases of known carcinogens into the air supply and the smell from a nearby landfill are of great concern.

An increasing interest in environmental health concerns by residents of Fresno, Texas suggested a need to conduct research to begin to document the perceived concerns voiced by members of this community. The purpose of this study was therefore to assess the perceptions of potential environmental exposures and their associated health outcomes in Fresno. Qualitative methodology (focus groups) was used to explore the residents' perceptions of the environment, potential environmental exposures, and how these environmental hazards could be affecting their health. Additionally, we wanted to determine whether qualitative methodology was useful in community-based environmental health research. Responses from the focus groups were then examined using content analysis to derive themes and conclusions. Overall, our findings demonstrated that Fresno residents perceive that they are exposed to environmental contaminants in the air and drinking water that could potentially alter their health.

## **Methods**

### **Participants**

Institutional approval from The University of Texas, M. D. Anderson Cancer Center was obtained to recruit participants to take part in focus group discussions. To be eligible, participants had to live in Fresno, Texas, for at least one year and be at least 18 years of age. All participants signed informed consent forms. Researchers used demographic information provided by the local elementary schools to identify major recruitment zones as defined by residential ethnicity characteristics. Newsletters and culturally tailored flyers were used as recruitment tools. Researchers also recruited participants in person in the Fresno community. Committed participants received a \$20 Target gift card after completing the focus group sessions.

### **Focus Groups**

Four focus group sessions were conducted between June 2005 and September 2006. Participants were asked to define environment and to discuss their perceptions of water quality, air quality, sources of environmental exposures, and the effect of Fresno's environment on their

health. Each one-hour focus group session met once and was held at either the local community center or the local elementary school library. A trained facilitator moderated the focus groups using a structured guide. In addition, the principal investigator and a second researcher were present at all four focus groups. Their role was to assist with the informed consent process, administer a demographic survey, take written notes during the group discussion, and tape record each session.

### **Data Analysis**

The focus group sessions were tape recorded and transcribed verbatim within 48 hours. Content analysis was used to identify the core consistencies of the qualitative data derived from the transcripts. A thematic framework was developed via inductive analysis. Themes were organized on the basis of the participants' perceptions of five broad areas: the environment, water quality, air quality, sources of environmental exposures, and the effects of the environment on health. The ATLAS.ti qualitative data analysis program (ATLAS.ti, Eden Prairie, MN, USA) was used to independently code the transcripts and test the reliability of themes.

## **Results**

### **Participants**

The demographic characteristics of each focus group are listed in [Appendix A](#). The mean age of the participants was 50.7 years. Most of the participants had resided in Fresno for less than 10 years, were employed outside of Fresno, and had varied levels of education. The participants were African-American and Caucasian. Hispanic/Latino residents were not included in this study because many of them only speak Spanish. Therefore, to ensure that we obtained the most accurate responses, the focus groups consisting of Hispanic/Latino Fresno residents were moderated in Spanish. Residential participants noted that they visit their doctor when ill and that they do not see a primary physician in the Fresno community. Fifty percent of the residents obtained their drinking water from their private well, and the other half obtained drinking water from the neighborhood municipal utility district water supply.

Additionally, most participants use the residential drinking water in their home, instead of purchasing bottled water. A sampling of responses from the focus group participants about the perceptions of environmental exposures and associated health effects in Fresno is located in [Appendix B](#).

### **Definitions of “Environment”**

When asked to define the word environment, the participants' answers varied considerably. Some residents defined environment as the air that we breathe and the trash in the area. Another resident stated, “The environment means the area that we live in.”

### **Perceptions of Water Quality**

The focus group participants were asked to describe the quality of the water in Fresno. The responses of the four groups were quite similar. Many participants described the water as hard and of poor quality. One participant said, “A lot of the water is not really good to drink.” Group members were concerned that the water was contaminated with chlorine, chemicals, and sewage. Many participants stated that they do not drink the water because of its appearance, funny taste, and bad odor, potentially caused by high sulfur content.

### **Perceptions of Air**

Participants were asked to describe the quality of the air they breathe, and their perceptions differed. While participants from focus group 4 described the air quality as good or clear, participants from groups 1, 2, and 3 perceived the air quality to be poor and called it potentially “dangerous.” One participant said, “It’s bad for the people that have breathing problems. It’s a lot of dust and stuff around here.” In contrast, another resident said, “But most of the time the air is blowing toward Houston so we get pretty good air here.” Participants also noted that there were particles in the air and toxins in the community.

### **Perceptions of Potential Sources of Environmental Exposure**

When asked, “What affects the air or water quality in this community?” residents from group 1 stated that local chemical companies

and chemical plants might be releasing chemicals into the air and possibly “pumping chemicals into the ground water.” One participant said, “They pump stuff into the ground. So they’re putting it into the ground water as well.” Group 4 participants were concerned about the long-term health effects associated with exposure to buried contaminants in a local landfill. Participants from group 4 also voiced concerns about chlorination in their drinking water, illegal dumping, farm animal waste, and the lack of a public water supply for some residents.

### **Perceptions of the Effect of Environmental Exposures on Health**

Most focus group participants believed that environmental exposures could negatively affect their health. Residents overwhelmingly stated that the water in the community might hurt their health. One resident said, “Some people think the biggest problem here as far as the health line is our water.” Additionally, some residents from group 4 were concerned about the air in this community affecting their health and mentioned both breathing and skin ailments.

### **Discussion**

Using focus group methodology, we found that members of the Fresno, Texas, community overwhelmingly perceived that their health is affected by environmental contaminants in their drinking water. We also identified residential concerns about the air quality and identified perceived sources of environmental exposures. As such, our study demonstrates that qualitative methods can be used in environmental health studies.

Environmental hazards do not affect all communities equally. Environmental inequities in the areas of air pollution and ambient air quality, ground water contamination and drinking water safety, proximity to noxious facilities and municipal landfills, illegal dumping, occupational health and safety, use of agricultural chemicals, and unequal enforcement of environmental laws have been shown to disproportionately affect people of color, as well as, tribal and low-income communities (Lee, 2002). The residents of Fresno are

approximately 75% ethnic/racial minorities consisting of over 49.9% Hispanic/Latino and approximately 26.5% African-American.

Though few studies have examined the perceived environmental issues related to water quality in minority communities, we were able to explore perceptions of air and water quality with members of a predominantly minority community (Williams and Florez, 2002). Although Hispanics/Latinos are 50% of the Fresno population, they were not included as participants in this study because of language barriers. Therefore, the findings in this study are not generalizable to the entire the Fresno community. Focus group participants believed the water quality in Fresno is poor. However, the groups' responses varied when discussing air quality. This variance might be reflective of the area of Fresno where residents live. Residents who live closer to the local chemical companies may experience poor air quality while those who live in the more recently constructed neighborhoods that are farther from the chemical companies and the dump may perceive better air quality. Potential sources of airborne environmental exposures in the Fresno community should be examined using standardized air monitoring to quantitatively assess the air quality.

Previous studies have shown that areas with high populations of African-Americans, Hispanics/Latinos, and Native Americans are more likely to have environmental hazards such as toxic industrial facilities and hazardous waste sites (Faber and Kreig, 2002; Lopez, 2002; Maantay, 2002; Morello-Frosch, Pastor, Porras, and Sadd, 2002). Fresno is one example of this as it is 75% minority, and it is located near a former Superfund site, a landfill, and an airport. From 1988 to 2002, Solvent Recovery Services, located 0.2 miles from Fresno, was listed on the Superfund Site Registry. Solvent Recovery Services was a paint solvent recycling plant that closed in 1984, leaving soil contaminated with metals and semivolatile and volatile organic compounds.

In addition, Champion Technologies, Inc., a company in Fresno that services oilfield

exploration and is monitored by the U.S. Environmental Protection Agency for release and waste trends, has been cited for violations. The Environmental Defense Scorecard has ranked Champion Technologies in the 40th to 50th percentile for air releases of recognized carcinogens (Scorecard, 2006). Moreover, focus group participants identified Champion Technologies as a perceived source of environmental exposure. There are 10 additional Environmental Protection Agency-regulated facilities that may contribute to environmental exposures in the Fresno community, and some of these facilities were named by focus group participants as potential sources of environmental contaminants.

The Environmental Protection Agency has stated that no population should be forced to bear a disproportionate burden of the environmental impact of pollution or other environmental consequences on human health (Environmental Protection Agency, 1998). However, there are limited data for examining the relationship between adverse health outcomes and social determinants of health, such as environmental or racial/ethnic factors (Institute of Medicine, 1999). To obtain more valuable data, qualitative methods such as key informant interviews and focus group discussion can be used in obtaining elaborate and useful information.

The findings from this study demonstrate that qualitative methods can be used to examine the environmental health concerns of community members. Similarly, previous studies of communities with potential environmental exposures have reported community concerns in terms of perceived and self-reported health status by using interview techniques (Lipscomb, Goldman, Satin, Smith, Vance, and Neutra, 1991; Luginaah, Taylor, Elliott, and Eyles, 2002; Williams, 2002). While we have shown the usefulness of qualitative methodology, there are noted limitations, such as moderator-participant interaction. If the focus group or interview participants do not trust the moderator, it is less likely that the moderator will elicit the participants' most open responses (Lobdell, Gilboa, Mendola, and Bradford, 2005).

In conclusion, we used focus group methodology to examine the perceptions about environmental exposures on health status among residents of a predominantly minority community. In doing so, we determined that residents do perceive that their air and residential drinking water are contaminated with

environmental hazards that may potentially affect their health. With community involvement, additional studies should be conducted to assess self-reported health status and to accurately measure environmental contaminant levels in the air and drinking water of the Fresno community.

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## Appendix A

### Demographic characteristics of Fresno focus group participants

	<b>Group 1 (n = 5)</b>	<b>Group 2 (n = 5)</b>	<b>Group 3 (n = 4)</b>	<b>Group 4 (n = 5)</b>
<b>Mean age, years (range)</b>	67 (52-84)	50 (19-80)	43 (39-52)	43 (27-55)
<b>Ethnicity</b>				
African-American	3	3	4	5
Caucasian	2	2	0	0
<b>Years residing in Fresno</b>				
0-10	3	2	3	4
11-20	1	0	1	1
21-30	1	0	0	0
31 or more	0	3	0	0
<b>Employed in Fresno</b>				
Yes	2	0	1	0
No	3	5	3	5
<b>Highest level of education completed</b>				
High School	1	2	0	0
Technical	1	1	0	0
Some college	3	0	0	1
College	0	1	1	3
Masters	0	0	3	1
Unknown	0	1	0	0
<b>Location of physician</b>				
Fresno, TX	0	0	1	0
Houston, TX	5	3	1	2
Sugarland, TX	0	0	2	2
Missouri City, TX	0	0	1	0
Other	0	2	0	1
<b>Where the resident goes when sick</b>				
Doctor	5	3	3	5
Emergency room	0	1	1	0
Clinic	0	1	0	0
<b>Drinking water source</b>				
Private well	5	4	0	0
Neighborhood MUD water supply	0	0	4	5
Other source	0	1	0	0
<b>Drink the water in the home</b>				
Yes	3	3	4	5
No	2	2	0	0

## Appendix B

### Sampling of responses from focus group participants about perceptions of environmental exposures and associated health effects in Fresno

#### **Definition of environment**

- “The environment means your surroundings.” (Group 3)
- “The area that we live in.” (Group 4)

#### **Perceptions of water quality**

- “It’s horrible; I don’t allow my kids to drink it from the water faucet.” “When we first filled up our glass it was disgusting.” (Group 4)
- “It does taste funny so that kind of concerns me. So we have resorted to bottled water because we don’t drink the water, although we do cook with it.” (Group 3)

#### **Perceptions of air quality**

- “Well I think you are always going to have a problem any time you have a chemical company they put some stuff in the air.” (Group 1)
- “The air is bad for the people that have breathing problems, it’s a lot of dust and stuff around here.” (Group 2)

#### **Perceptions of potential sources of environmental exposure in the Fresno community**

- “There’s some chemical plants down here you know that most of the time the air blows that way. I don’t know what they are doing but some of its dangerous. I think!” (Group 1)
- “Even the animals can affect the water during a dry spell.” (Group 1)
- “I can taste the chlorine in the water.” (Group 4)

#### **Perceptions of the effect of environmental exposures on health status**

- “Her doctor doesn’t even want my mom to bathe in the water because it might be making her sick.” “There is some kind of contamination in the water. That’s the reason it is not healthy for us.” (Group 2)
- “In the long run I think that the water will affect our health.” (Group 4)