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# Variation in Environmental Risk Perceptions and Information Sources among Three Communities in El Paso

Theresa L. Byrd, James VanDerslice & Susan K. Peterson\*

## Introduction

The U.S.-Mexico border stretches over 2,000 miles and is home to over 10 million people. Two federal governments, ten state and many local governments share responsibility for health problems due to a wide array of environmental sources. These include poor air quality, illegal disposal of hazardous and nonhazardous wastes, heavy use of pesticides, and depleting water resources. The metropolitan areas along the U.S.-Mexico border are experiencing rapid population growth. This is in part due to new economic opportunities in the *maquila* industries, as a result of the North American Free Trade Agreement.<sup>1</sup> On both sides of the border, basic infrastructure, e.g., potable water systems and wastewater treatment, is often lacking. As a result, environmental problems and their impacts on health are expected to increase.

Over the last several years, local, state and federal agencies from both the U.S. and Mexico have been working on a plan to address these issues. The plan, called Border XXI<sup>2</sup> will rely on a three-pronged strategy of public involvement, decentralized environmental

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<sup>1</sup> North American Free Trade Agreement, Dec. 17, 1992, 32 I.L.M. 605.

<sup>2</sup> Environmental Protection Agency, U.S.-Mexico Border XXI Program Framework Document (1996).

management, and improved communication and cooperation among federal, state, and local entities. Public involvement is seen as an important mechanism for identifying solutions to environmental problems and communicating these solutions to decision-makers. The primary strategies for encouraging public involvement are to improve access to environmental information, and to provide opportunities for the public to review and comment on Border XXI plans and reports.

Although the U.S. Environmental Protection Agency (USEPA) attempted to gather and incorporate public opinion in the development of Border XXI, these results suggest that they and other agencies need to improve risk communication techniques and expertise, particularly among those agencies who will be working on the U.S.-Mexico border. For example, community meetings were the primary means of gathering public input, but the meetings were not well publicized among all segments of the community. The meetings were publicized mainly through newspapers, a channel not widely used by that community members living in areas most likely to be affected by environmental problems. Because of this, these community meetings were attended by few community members who were not professors, health professionals, or agency representatives. Although these were also members of the community, they generally did not live in the areas most likely to be impacted by environmental decisions.

The U.S.-Mexico border area is unique because of its blend of cultures, customs, and languages, as well as a wide range of living conditions. Tens of thousands of residents move back and forth across the border on a daily basis, and many families have roots in both countries. The ability to communicate environmental risks effectively is increasingly important for agencies along the U.S.-Mexico border due to NAFTA-related industrial activity, the public's awareness of the risks to health associated with environmental contamination, and concern regarding the two-way migration of contaminants between countries. If environmental and health agencies are to effectively disseminate environmental information to communities, and gather accurate information from them, they must understand what community members know about environmental risk, and which risks they perceive to be problems for themselves and their communities. They must also learn how communities obtain information about environmental risks.

Technical experts often believe that others understand risk the way they do, usually as the probability of a harmful event occurring and the consequences of that event. Research has shown that this is not the case.<sup>3</sup> The process that an individual uses to assess the risk posed by a hazard is complex, involving both intellect and emotion. For example, although it is clear from a statistical perspective that flying is much safer than driving, individuals have frequently reported feeling more at risk in an airplane than in a car. This apparent misjudgment may be due to several factors, including the feeling of loss of control in an airplane, and the catastrophic nature of aviation accidents. Slovic et al., in their study of how lay people and experts rate risks, found that lay people tend to rank nuclear power as riskier than other hazards, not necessarily because of the number of deaths that it might cause, but because of qualitative aspects of the hazard, such as being seen as involuntary, uncontrollable, dreaded and potentially catastrophic.<sup>4</sup>

Perception of risk may be affected by many factors, including those that Sandman refers to as "outrage" factors.<sup>5</sup> Risks that are perceived to be involuntary, industrial, and unfair are usually perceived as more risky than those that are voluntary, natural, and fair. This may explain why communities have been more vocal about industrial facilities located in their neighborhoods than about other hazards that technical experts might see as much more risky, such as indoor radon. This may be especially true if the community was not involved in the decision to locate a facility in their neighborhood. In addition, hazards that are exotic, memorable, and dreaded are considered more risky than those that are familiar. Studies have also shown that gender, race, and culture can greatly affect perceptions of risk.<sup>6</sup> Flynn and colleagues found that in the U.S., both Hispanics and African-Americans were more likely to report a perception of risk from environmental hazards than were whites.<sup>7</sup> These differences may be due, in part, to the fact that

<sup>3</sup> Paul Slovic et al., *Rating the Risks*, 21 *Environment* 14, 36 (1979).

<sup>4</sup> *Id.*

<sup>5</sup> Peter Sandman, *Hazard Versus Outrage in the Public Perception of Risk*, in *Effective Risk Communication* 45 (Vincent Covello et al., eds. 1989).

<sup>6</sup> Brandon B. Johnson, *Risk and Culture Research: Some Cautions*, 22 *J. Cross-Cultural Psychol.* 141 (1991); Karl Dake, *Myths of Nature: Culture and the Social Construction of Risk*, 48 *J. Soc. Iss.* 21(1992) and James Flynn et al., *Gender, Race, and Perception of Environmental Health Risks*, 14 *Risk Anal.* 1101 (1994).

many hazardous waste sites and other environmental hazards are located closer to communities where Hispanics and African-Americans live. The citing of environmental hazards in low-income communities and communities of color, and the greater attention paid to cleaning up waste sites in more affluent and white communities has been reported in the literature, and is often referred to as "environmental racism".<sup>8</sup> In addition, when considering risks to themselves as compared to risks to others, most people believe that others are at greater risk. This has been referred to as the optimistic bias.<sup>9</sup>

Given the unique cultural mix of the El Paso area, it seemed likely that residents' risk perceptions would be very different from those of environmental agencies responsible for serving the area. Previous studies of public perceptions of risk did not seem to be directly applicable to this border area because they have largely been conducted on Caucasian, middle-class populations. The wide variability in income, education and living conditions suggested that there might be substantial differences in risk perception among border communities. A pilot study explored local perceptions of environmental risk and sources of environmental information in three socio-economically and culturally distinct El Paso communities. The resulting information will help to develop strategies and techniques to improve risk communication and to encourage public involvement.

## Methods

### *Study Communities*

According to the 1990 U.S. Census, over 70% of the approximately 600,000 residents of El Paso, Texas are Hispanic.<sup>10</sup> Yet, there is also great area variability in income and education levels. To assess the extent that risk perceptions varied within this area, three very different communities were selected for study. Community A is a *colonia*, a

<sup>7</sup> *Id.*

<sup>8</sup> U.S. General Accounting Office, *Siting of Hazardous Waste Landfills and their Correlation With Racial and Economic Status of Surrounding Communities* (1983); Robert Bullard, *Dumping in Dixie: Race, Class, and Environmental Quality* (1990).

<sup>9</sup> Neil D. Weinstein, *Unrealistic Optimism about Susceptibility to Health Problems: Conclusions From a Community-Wide Sample*, 10 *J. Behav. Med.* 481 (1987).

<sup>10</sup> 1990 U.S. Census.

semi-rural, very-low income area lacking municipal services such as piped water, sewerage, and garbage collection. Many of the housing units in this area are considered substandard, and due to the lack of services, many residents must purchase drinking water from stores and use inadequate on-site excreta disposal. According to 1990 U.S. Census figures, median per-capita income in this area was only \$5,500, and almost 90% of the residents reported their ethnicity as Hispanic.<sup>11</sup>

Communities B and C are both situated within the El Paso city limits and receive all usual municipal services. Community B is a low-income area adjacent to an industrial area containing chemical and garment manufacturing plants and two oil refineries. Over 95% of these residents are Hispanic with a median per-capita income of only \$4,600. Community C is a higher income suburban area, consisting primarily of residences and retail businesses. The median per-capita income of this area was almost \$18,000, and only 40% were Hispanic.

#### *Instrument Development*

The questionnaire was adapted from an existing instrument which was developed by Slovic, et al. for use in the Canadian population.<sup>12</sup> To refine the study instrument and ensure its appropriateness for the target population, four focus groups of persons representing the three study communities were conducted. One took place in Community A, two in Community B, and one in Community C. A moderator's guide was developed to facilitate and structure the discussion. Discussion centered on how participants defined risk and risk perception, their familiarity with various environmental and health risks, and their use of and familiarity with various health and environmental information sources in the community.

Based on findings from the focus groups, the original questionnaire was shortened, questions about little known risks were removed and those regarding other risks specific to the border were added. The study questionnaire included items regarding knowledge and evaluation of environmental and health risks in El Paso, sources of risk information and their credibility, responsibility of sources to give risk

<sup>11</sup> *Id.*

<sup>12</sup> Paul Slovic et al., *Health Risk Perception in Canada* (Canadian Dept. of Nat. Health and Welfare 1993).

information, and how well sources met that responsibility. To assess perception of risk, respondents were given a list of hazards and were asked to rate the "riskiness" of each item for themselves and for the community as a whole. They were asked to use a five-point Likert scale ranging from "very high risk" to "almost no risk". A list of information sources was also provided, and for each one respondents were asked how much information they received from each source, again using a five-point Likert scale. For each information source, respondents were also asked to rate the amount of confidence they had in that source, the source's responsibility to give information, and how effectively each source fulfilled their responsibility.

#### *Data Collection*

Data were collected from May through September, 1995. Several blocks in each community were randomly selected, and interviewers approached each house on those blocks. Houses where no one was home were skipped and no efforts were made to return to those residences.

Interviewers greeted the first adult resident who answered the door and explained the purpose of the study. Following verbal consent, the interview was conducted in the participant's home. If the resident who answered the door refused, no attempt was made to interview other household members. Questionnaires were prepared in both English and Spanish and the participant was asked which language they felt more comfortable using. The interview took approximately 40 minutes to complete. A total of 147 persons were interviewed. Among individuals who were approached, the number of refusals was less than 10%.

#### *Data Analysis*

Focus group data were analyzed using qualitative methods, and the results were used to support and explain survey data. Survey data were analyzed using SPSS for Windows (Version 6.0). Frequencies and proportions were used to describe the sample. The ratings of perceived risk were collapsed to compare the proportions of respondents rating each factor as posing a "high risk." The Chi-square statistic was used to assess the statistical significance of these comparisons.

## Results

### *Characteristics of the Sample Population*

In Community A and Community C, the largest age category was 30 to 44 years (37% of the sample for each). In Community B, the sample was older, with 40% in the over-55 age category. Communities were not significantly different in terms of gender. The majority of people interviewed in Community C (86.7%) reported that they were employed, while those in Communities A and B reported employment less often. In Community C, 94% of respondents reported having had some college or more education, compared to 16% in Community A and 24% in Community B (Table 1). According to the 1990 U.S. Census, nearly all residents of Communities A and B are Hispanic, while Community C is 40% Hispanic. Over 80% of non-Hispanic residents in El Paso are classified as white.<sup>13</sup>

Table 1  
Demographic Characteristics of the Respondents

<i>Characteristic</i>	<i>Community A</i>	<i>Community B</i>	<i>Community C</i>
Number interviewed	51	50	46
Male 41%	32%	44%	
Female	59%	68%	56%
Age of respondent			
18-29	16%	30%	28%
30-44	37%	16%	37%
45-54	20%	14%	22%
≥ 55	27%	40%	13%
% Employed	35%	26%	87%
Highest educational level			
< Grade 6	41%	31%	4%
HS graduate	43%	44%	2%
Some college	12%	17%	33%
College grad	2%	4%	37%
Beyond college	2%	4%	24%
% Hispanic*	90%	96%	40%
Median per capita income*	\$5,495	\$4,634	\$17,884

\* Source: 1990 U.S. Census, STF3A files.

<sup>13</sup> 1990 U.S. Census.



*Perceptions of Risk*

There were distinct differences between the three communities in the levels of perceived risk and the specific factors thought to pose a high risk (Table 2).

Table 2  
Percentage of Respondents Indicating that Hazard is  
"High risk to myself and my family," and "High risk to community as a whole"

<i>High Risk Hazard</i>	<i>Self &amp; family</i>			<i>Community as a whole</i>		
	<i>A</i>	<i>B</i>	<i>C</i>	<i>A</i>	<i>B</i>	<i>C</i>
Crime	55	42	15	76	73	42
Destruction of ozone layer	49	46	22	51	51	30
Dumping of hazardous waste	49	46	13	63	67	41
Nuclear waste	45	49	15	49	58	16
No sewerage	80	18	4	62	31	29
Sun exposure	43	35	22	51	49	29
Chemicals in the environment	46	31	20	44	48	44
AIDS	40	31	24	81	64	39
Car accidents	46	33	15	64	54	26
Waste incinerators	57	22	7	51	33	25
Ambient air pollution	34	22	8	40	44	46
Global warming	42	32	14	42	42	24
Pesticides in food	38	31	9	36	35	19
Illegal drugs	38	28	9	74	83	41
Drinking water	28	28	17	36	46	37
Smoking	33	26	13	54	58	24
Bacteria in food	33	22	9	39	29	13
High tension wires	17	10	5	22	19	12
Asbestos	6	20	4	13	29	7
Indoor air pollution	4	6	0	46	6	7

Data in bold indicates statistically significant ( $p < 0.05$ ).

In general, a higher proportion of residents in Community A perceived the study factors as posing a "high risk" as compared to the other two communities, while a substantially smaller proportion of respondents from the higher-income community (Community C) felt threatened by the factors mentioned. Many of these differences in perception were statistically significant. A particularly interesting finding concerns drinking water and sanitation. While a much higher

proportion of the residents of Community A (>80%) felt that the lack of sewerage posed a "high risk," the proportion who felt that drinking water posed a high risk was similar across the three communities.

When respondents were asked to rate the level of risk that the factors posed to the community as whole, the differences between the communities were not as striking (Table 2). However, the higher-income residents of Community C still tended to perceive the hazards as less risky to all of El Paso. Lack of sewerage, indoor air pollution and AIDS were more often seen as posing a high risk by the residents of Community A as compared to the other communities.

*Perception of Risk to Self versus Risk to Community*

As was expected, "risks to the community as a whole" were consistently ranked higher than "risks to myself and my family", with only a few exceptions in Community A (Table 3).

Table 3  
Difference of Percentage of Respondents indicating Twenty Hazards as  
"High risk to the community" vs "High risk to self and family"

<i>Hazard</i>	<i>Community A</i>	<i>Community B</i>	<i>Community C</i>
Pesticides in food	-2	6	10
Nuclear waste	4	9	1
Indoor air pollution	42	0	7
Depletion of the ozone layer	2	5	8
Asbestos	7	9	3
Bacteria in food	6	7	4
No sewerage	-18	13	25
High tension wires	5	9	7
Waste incinerators	-6	11	18
Global warming	0	10	10
Sun exposure	8	14	7
Chemicals	-2	17	24
Ambient air pollution	6	22	18
Car accidents	18	21	11
Drinking water	8	18	20
Dumping hazardous waste	14	21	28
Smoking	21	32	11
Crime	21	31	27
AIDS	41	33	15
Drugs	36	55	32

Note: The difference was obtained by subtracting the percentage answering "high risk" for each hazard for self from that for the community. A negative indicates that for this risk, the community indicated a higher risk to self than to community.

Interestingly, several factors for which there was the greatest difference between perceived "risk to self" and "risk to community" were risks not associated with environmental contamination: drugs, AIDS, crime, and smoking. Community A differed from the other two communities in that for several hazards, they rated "risk to self and family" higher than "risk to the community". These factors included pesticides in food, lack of sewerage, chemicals in the environment, and waste incinerators. Communities B and C rated all of the hazards as a higher risk to the community as a whole than to themselves or their families.

#### *Sources of Environmental Information*

The majority of respondents from the three areas (64%) reported getting a "fair amount" to "a lot" of information from television, and 27% reported the same for radio (Table 4).

Table 4  
Amount of Environmental Information from Various Sources

<i>Source</i>	<i>Community A</i>	<i>Community B</i>	<i>Community C</i>
Television			
A lot	13.7	10.0	23.9
A fair amount	47.1	50.0	47.8
A little	27.5	32.0	19.6
Almost none	11.8	8.0	8.7
Newspaper*			
A lot	3.9	10.0	17.4
A fair amount	23.5	30.0	50.0
A little	25.5	16.0	23.9
Almost none	47.1	44.0	8.7
Radio			
A lot	5.9	4.1	13.0
A fair amount	19.6	12.2	26.1
A little	39.2	26.5	32.6
Almost none	35.3	57.1	28.3
Private industry*			
A lot	2.0	2.0	2.2
A fair amount	7.8	0.0	21.7
A little	19.6	14.0	39.1
Almost none	70.6	84.0	37.0
City health department*			
A lot	2.0	8.0	13.0
A fair amount	17.6	32.0	30.4
A little	27.5	22.0	47.8
Almost none	52.9	38.0	8.7

*Con'd*

Texas Dept. of Health*			
A lot	0.0	10.0	6.5
A fair amount	10.0	20.0	34.8
A little	20.0	26.0	39.1
Almost none	70.0	44.0	19.6
EPA*			
A lot	2.0	6.0	10.9
A fair amount	3.9	4.0	23.9
A little	5.9	10.0	47.8
Almost none	88.2	80.0	17.4
University scientists*			
A lot	0.0	4.0	13.0
A fair amount	4.0	8.0	19.6
A little	16.0	16.0	43.5
Almost none	80.0	72.0	23.9
Friends and relatives*			
A lot	3.9	12.0	22.2
A fair amount	21.6	26.0	35.6
A little	35.3	34.0	26.7
Almost none	39.2	28.0	15.6

\* Statistically significant ( $p < 0.05$ ).

The other major media source given as an option was the newspaper. Here the three communities differed significantly ( $p < 0.05$ ). Residents of Communities A and B were far more likely to say they got "almost no information" on health risks from the newspaper (48% and 44% respectively) while only 9% from C gave this response.

Public agencies were not a major source of environmental information, particularly for lower-income communities. For example, only 6% of the residents of Community A and 10% of the residents of B reported receiving "a lot" or "a fair amount" of information from the EPA. In fact, many of these residents had never heard of the EPA. The City Health Department clearly has been the most successful in these areas. In every case, Community A was more likely to say that they received little information from agency sources.

Regarding the amount of confidence they have in information sources, the majority from all three areas (54%) reported that they have "a fair amount" to "a lot" of confidence in television, and 46% in the radio. Only 20% reported having confidence in industry (Table 5). Confidence in newspapers as a source of information differed significantly by community, with Communities A and B having the least confidence in this source. Residents from Community A had

much less confidence in information from the public agencies as compared to the other communities. In particular, only 18% of the Community A residents had "a lot" or "a fair amount" of confidence in information from the EPA, while over 55% of B and nearly 90% of C had this level of confidence.

Table 5  
Level of Confidence in Information Sources

<i>Source</i>	<i>Community A</i>	<i>Community B</i>	<i>Community C</i>
Television			
A lot	8.9	10.2	9.1
A fair amount	28.9	49.0	56.8
A little	55.6	38.8	2.0
Almost none	6.7	29.5	4.5
Newspaper*			
A lot	3.4	12.5	10.9
A fair amount	37.9	32.5	65.2
A little	48.3	47.5	19.6
Almost none	10.3	7.5	4.3
Radio			
A lot	10.8	2.7	15.9
A fair amount	27.0	35.1	43.2
A little	48.6	37.8	34.1
Almost none	13.5	24.3	6.8
Private industry			
A lot	0.0	3.0	4.9
A fair amount	20.8	9.1	22.0
A little	37.5	27.3	31.7
Almost none	41.7	60.6	17.3
City health department*			
A lot	14.3	26.2	26.2
A fair amount	32.1	59.5	54.8
A little	21.4	11.9	19.0
Almost none	32.1	2.4	0.0
Texas Dept. of Health*			
A lot	5.3	25.6	20.5
A fair amount	36.8	48.7	61.5
A little	52.6	17.9	17.9
Almost none	5.3	7.7	0.0
EPA*			
A lot	9.1	14.8	19.0
A fair amount	9.1	40.7	66.7
A little	36.4	18.5	9.5
Almost none	45.5	25.9	4.8
University scientists*			
A lot	6.3	25.8	21.4
A fair amount	31.3	32.3	57.1
A little	43.8	29.0	16.7
Almost none	18.8	12.9	4.8

*Con'd*

Friends and relatives			
A lot	8.6	11.6	9.1
A fair amount	37.1	48.8	56.8
A little	42.9	32.6	29.5
Almost none	11.4	7.0	4.5

\* Statistically significant ( $p < 0.05$ ).

When asked about the information sources' responsibility to inform of health risks, the media were not as likely to be assigned "major responsibility". Instead, the local and state health departments and the EPA were most often seen to have it (Table 6).

Table 6  
Respondent's perception of each information source's level of responsibility to provide environmental information, by community

Source	Community A	Community B	Community C
Television			
Major responsibility	28.6	18.0	34.8
Moderate responsibility	32.7	36.0	39.1
Some responsibility	28.6	30.0	23.9
No responsibility	10.2	16.0	2.2
Newspaper*			
Major responsibility	28.6	4.3	34.8
Moderate responsibility	28.6	45.7	45.7
Some responsibility	33.3	34.8	13.0
No responsibility	9.5	15.2	6.5
Radio			
Major responsibility	31.7	7.1	22.7
Moderate responsibility	31.7	31.0	36.4
Some responsibility	31.7	40.5	31.8
No responsibility	4.9	21.4	9.1
Private industry*			
Major responsibility	40.5	31.1	58.7
Moderate responsibility	35.7	22.2	19.6
Some responsibility	16.7	26.7	13.0
No responsibility	7.1	20.0	8.7
City health department			
Major responsibility	63.6	68.8	75.6
Moderate responsibility	18.2	22.9	11.1
Some responsibility	15.9	8.3	8.9
No responsibility	2.3	0.0	4.4
Texas Dept. of Health			
Major responsibility	57.6	76.2	74.4
Moderate responsibility	24.2	16.7	16.3
Some responsibility	12.1	7.1	7.0
No responsibility	6.1	0.0	2.3
			<i>Con'd</i>

## EPA

Major responsibility	56.5	51.7	68.2
Moderate responsibility	21.7	31.0	15.9
Some responsibility	13.0	17.2	13.6
No responsibility	8.7	0.0	2.3

## University scientists

Major responsibility	33.3	33.3	33.3
Moderate responsibility	30.6	20.5	40.0
Some responsibility	27.8	35.9	17.8
No responsibility	8.3	10.3	8.9

## Friends and relatives

Major responsibility	12.8	17.0	22.7
Moderate responsibility	34.0	34.0	22.7
Some responsibility	42.6	29.8	38.6
No responsibility	10.6	19.1	15.9

\* Statistically significant ( $p < 0.05$ ).

Community A was more likely to say that agencies, including health departments, the EPA, universities and private industry do a poor job of informing the public of health risks. However, differences between communities were not striking (Table 7). Residents of the higher-income community had a somewhat lower rating of the performance of the media as compared to other communities.

Table 7  
Respondents' Perceptions of How Well Information Sources  
Fulfill Responsibility to Inform of Environmental Risks

Source	Community A	Community B	Community C
Television*			
Excellent	11.9	4.0	0.0
Good	38.1	48.0	31.1
Adequate	38.1	40.0	44.4
Poor	11.9	8.0	24.4
Newspaper			
Excellent	3.3	2.6	2.2
Good	26.7	35.9	44.4
Adequate	43.3	53.8	37.8
Poor	26.7	7.7	15.6
Radio			
Excellent	6.1	5.7	2.5
Good	27.3	34.3	22.5
Adequate	51.5	40.0	50.0
Poor	15.2	20.0	25.0
			<i>Con'd</i>

Private industry			
Excellent	0.0	2.5	2.2
Good	15.6	20.0	15.6
Adequate	18.8	37.5	44.4
Poor	65.6	40.0	37.8
City health department*			
Excellent	10.0	19.0	11.4
Good	22.5	45.2	36.4
Adequate	30.0	33.3	36.4
Poor	37.5	2.4	15.9
Texas Dept. of Health*			
Excellent	7.7	17.1	4.8
Good	26.9	45.7	40.5
Adequate	23.1	37.1	40.5
Poor	42.3	0.0	14.3
EPA*			
Excellent	5.9	16.7	7.0
Good	29.4	33.3	27.9
Adequate	17.6	41.7	48.8
Poor	47.1	8.3	16.3
University scientists*			
Excellent	7.4	22.6	4.7
Good	25.9	35.5	23.3
Adequate	25.9	35.5	53.5
Poor	40.7	6.5	18.6
Friends and relatives			
Excellent	2.3	12.2	5.0
Good	44.2	46.3	50.0
Adequate	32.6	26.8	35.0
Poor	20.9	14.6	10.0

\* Statistically significant ( $p < 0.05$ ).

### Discussion

It is clear from this pilot study that risks are perceived differently by different communities in the same city. This may partly be due to the real differences in risk in different areas. Those in the higher income areas perceived all hazards as less risky, and in fact, they have fewer industries in their area, and are adequately served by city utilities. Those living in the colonias, where water quality and lack of sewerage are serious problems, perceived higher risk from these hazards.

In general, people perceived less risk to themselves than to the community as a whole for all hazards. This may be due to an "optimistic bias", which operates for many kinds of risks. This did not hold true, however, for Community A. Four hazards: pesticides in food, no sewerage, chemicals in the environment, and waste incinerators



were perceived by the respondents in Community A as more of a risk to themselves than to the El Paso community. It makes sense that residents of Community A would see lack of sewerage as a particularly severe risk for themselves, since they are not served by the municipal system. There is not a clear reason why they would see the other hazards as particularly risky for themselves and not for the City of El Paso as a whole. According to their focus group responses, Community A has struggled to bring about changes to improve the quality of life in the area, and many of their efforts have not been fruitful. This has led to a feeling of helplessness, and a tendency to feel that self and family are more at risk because government agencies have not been responsive to the needs of the community.

Community A also had the least amount of confidence in all agencies, including health departments, the EPA and university scientists. In focus groups, people from Community A commented that they have been "studied all the time, but nothing ever changes". This sentiment was repeated during the door-to-door survey collection. Hance et al. suggest that, in addition to explaining risks to the public, agencies need to place a greater priority on understanding the community's concerns and values and involving them in risk decisions.<sup>14</sup> Residents in Community A perceive that this has not been an agency priority, and may believe that nothing they do will ever change the existing risk conditions.

Knowing from what sources people get health risk information can shed some light on why people are concerned about particular risks. The study results indicate that television is a major source of information about environmental risk. The way that risk is portrayed by the media, and the methods they use to choose stories, may have an influence on people's perceptions of risk. For example, depletion of the ozone layer was rated as one of the highest risks for the community of El Paso. It may be that because the news media reports on ambient ozone levels almost daily, that the public confuses this with ozone depletion. This confusion may be due to lack of public education, or to lack of clear risk communication by the media. Clearly, the goals of

<sup>14</sup> Billie Jo Hance et al., *Setting a Context for Explaining Risk*, 9 Risk Anal. 113 (1989).

mass media are different than the goals of government and health agencies in terms of risk communication. Although television news media are constrained by the amount of information they can present on any given story, there may be a need to educate reporters on environmental and health risk communication so that they report such stories in the most understandable manner possible.

Although many residents in Communities B and C expressed confidence in EPA, the majority had not received information from it, and most did not even know of the agency. Since EPA has recently placed an office in El Paso, and is the lead agency in the Border XXI project, these findings suggest that it has potential to become an important information source for the community but may need to publicize their presence and role more aggressively within the communities surveyed. In general, people stated they did not receive, and would not have confidence in, risk information from industry.

The results of this study are useful in forming a preliminary profile of community risk perceptions in the El Paso area, but there are several limitations that need to be addressed in future studies. First, the questions about risk from particular hazards did not allow for an assessment of the respondent's knowledge of the hazard. In many cases, the respondents seemed to misunderstand the nature of the hazard. For example, many respondents felt that the hazard from high tension power lines was that electric shock might occur. Others appeared to have confused depletion of the ozone layer with high levels of ground-level ozone, a finding that is reported daily in the news. Second, the questionnaire did not address the criteria that respondents use to evaluate how risky a particular hazard is. It would be useful to investigate how this population evaluates risks from various environmental hazards, in order to gain an understanding of any cross-cultural differences that may exist. Third, the sample was small and not randomly selected. Finally, the survey did not ask for detailed information about where risk information is obtained. For instance, the names of specific radio or television stations where people obtained information was not solicited.

### Conclusions

Public perceptions of risk are important because they may influence policy, and misperceptions help to create poor policy. Effective risk communication may be useful in enhancing the public's understanding of environmental risk, and in involving communities in decisions about their environment and their health. To effectively understand and communicate risk, it is necessary for experts to understand that the public frequently perceives risks differently from them, and that perception of risk is influenced by many factors, including issues of control and emotion.

In addition, future studies should focus on helping to learn more about how individuals from various ethnic and cultural backgrounds form their ideas about the risks which concern them. A better understanding of the processes involved in the formation of beliefs about one's environment may help to develop new methods for working with communities to resolve potentially contentious environmental issues before misperceptions are formed.

