Perceptions of Global Warming: An Environmental Justice Approach in West Oakland

Ja-Ming Emily Lee

Abstract The motivation for this study was to use an environmental justice framework to address the perception of climate change among communities of color and low-income individuals. The environmental justice movement has demonstrated that these communities are disproportionately impacted by environmental and health hazards, compared to the general public. Recent literature has shown that these same communities are more vulnerable to climate change events, and have greater exposure to industrial and automobile emissions that contribute to global climate change. It is necessary, therefore, to address disadvantaged communities' concerns and opinions about climate change. In this study, I hypothesize that disadvantaged communities lack knowledge of a specific climate change issue—global warming—because they lack access to information. Through a series of focus groups, I explore the perceptions of global warming among West Oakland, California residents. Results show that participants have extensive knowledge of local environmental problems and familiarity with certain global problems, but less knowledge of how local problems relate to global warming. A perception gradient also exists among participants that ranges from a minimal to in-depth understanding of how local actions relate to global warming. These results indicate that West Oakland residents are cognizant and concerned about the effects of environmental pollution, but lack access to information to connect local problems to global warming's effects. I conclude that policymakers, scientists, and civil society engaged in climate change issues need to specifically address this local-global connection through the involvement of disadvantaged communities in climate policy discussions.

Introduction

Climate change and the policy enacted to mitigate greenhouse gas producing activities affect all sectors in the United States—industry, water, energy production and use, human health, and agriculture to name a few. Given the impacts of climate change, public participation is necessary to ensure that all communities, and especially those with the least access to resources, have an audible voice in the decision-making process of climate policy discussions (Miller, 2000). The efficacy of educating the public about climate change will largely depend upon the relevancy of issues—that is, educators must identify whether communities have any existing perceptions of climate change, and if so, which climate change issues citizens feel particularly strongly about.

Given the U.S. popular media's representation of "scientific uncertainty" about climate change (Zehr, 2000), as well as the public's lack of scientific understanding and concern about climate change (Ungar, 2000), an informed discussion of climate change issues among American citizens needs to be established. In particular, the perceptions and concerns of communities of color and low-income individuals need to be addressed, as these individuals are disproportionately affected by the consequences of climate change and their voices are underrepresented.

A recent study found that minority and low-income communities are (1) exposed to higher levels of pollution than the rest of the nation and (2) experience certain diseases in greater number than more affluent, White communities (Institute of Medicine, 1999). Additionally, studies have shown that people of color are twice as likely to die in climate change-related events such as heat waves, and suffer from more heat-related stress and illness (Kalkstein, 1992). Kalkstein's (1992) study of the fifteen largest American cities found that climate change would increase heat-related deaths by at least 90 percent. A report recently released from the Center for Health and the Global Environment at Harvard Medical School argues that "the combination of air pollutants, aeroallergens, heatwaves and unhealthy air masses, increasingly associated with a changing climate, causes damage to the respiratory systems…and these impacts disproportionately affect poor and minority groups in the inner cities" (Epstein and Rogers, 2004).

Based on the findings of this research, it is clear that in developing a climate policy, the concerns and opinions of communities of color and low-income individuals must be accounted for in the process. It is therefore necessary to establish how communities of color discuss and

interpret climate change related issues. However, there are very few studies performed on the perceptions of climate change among communities of color and low-income individuals in the U.S. In fact, the majority of existing research about perceptions and attitudes toward climate change (Doble, 1995; Stamm *et al*., 2000; Bord *et al*., 2000; Ungar, 2000) does not address poor or minority communities at all. While the general public's opinion of climate change has been established, there is still need for research that addresses the perceptions of disadvantaged communities in the U.S. By understanding how communities of color and low-income individuals relate the concepts and risks of climate change, environmental justice education and outreach programs can be more effective for those communities that are most impacted by climate change.

The priorities of communities of color must also be taken into consideration by environmental justice organizations and environmental groups. Evans *et al*. (2002) found that focus groups comprised of African American and Latino women in New York City had different ideas about the importance assigned to environmental health risks than did the Columbia Center for Children's Environmental Health (CCCEH). This finding suggests that communities of color may have different perceptions of environmental concerns than environmental health organizations or agencies, which is a major impediment to accomplishing health improvements. While investigating Detroit youths' understanding of pollution, Wals (1994) identified three levels of perception that are useful in understanding the different ways in which environmental issues may be discussed and perceived by inner-city populations. In order to successfully educate these affected communities about global warming educators must clearly identify the issues of climate change that communities are most concerned with.

My research will investigate the processes in which communities of color and low-income individuals in West Oakland perceive a specific aspect of climate change—global warming—and how they consider problems resulting from global warming relevant to their lives. I have chosen to focus on West Oakland because it is a poor and minority community, as well as an area where environmental justice and global warming issues are especially relevant. U.S. Census 2000 figures for the racial and ethnic composition of West Oakland are 64 percent African Americans, 16 percent Latinos, nine percent Asian and Pacific Islanders, and seven percent Whites (Alameda County Public Health Department, 2001). Over two-thirds (71 percent) of households in West

Oakland earned an income of less than $30,000 in 1999, as compared to 28 percent in Alameda County as a whole (Alameda County Public Health Department, 2001).

In terms of local environment, in 1997, West Oakland residents had the second highest health risk from air pollution in the city of Oakland (Pacific Institute and 7th Street McClymonds Corridor, 2002). West Oakland children are also seven times more likely to be hospitalized for asthma than the average child in California (Pacific Institute and Coalition for West Oakland Revitalization, 2003). Additionally, the same report (2003) found there are six times more diesel particulates (from diesel truck emissions) emitted per person and over 90 times more diesel particulates per square mile every year in West Oakland than in the State of California. Industrial and urban air emissions have severe effects on local community health, and at the same time contribute to the greenhouse effect which propels climate change and specifically, in my study, global warming. The same industries whose emissions contribute to global warming are also seriously affecting residents in West Oakland, and my research seeks to identify community knowledge and perceptions of global warming.

It is necessary to establish the priorities and perceptions of climate change issues in communities that will be disproportionately affected by global warming, so that they have the means to protect and empower themselves by participating in the discourse on climate policy. Therefore, this research will provide new information that is useful for public policy, environmental, and community organizations in education and outreach programs for climate change issues.

Methods

This study employs qualitative and quantitative methods to explore the perceptions of global warming in West Oakland. Focus groups and surveys were conducted, and narrative analysis and statistical analysis were used to interpret the data. I have used focus group discussions because they allow for in-depth data collection. Krueger and Casey (2000) argue that the focus group presents a more natural environment than an interview because participants are influencing and influenced by others—just as they are in real life. Limitations of the methods are described in the "Discussion" section of this paper.

Objectives My main objectives are to explore the following questions: (1) What are the perceptions and ideas that West Oakland residents—primarily African-American women—have

around the issue of global warming? (2) How do West Oakland residents see their local lives connected to global environmental concerns such as global warming? (3) Are these opinions and perceptions different from the general public, as indicated in the relevant environmental questions in the General Social Survey?

Data Collection To obtain both qualitative and quantitative data in my research, I collected data using: focus groups and closed surveys. Focus groups allow me to find a range of ideas or feelings that individuals in West Oakland have about climate change. I am also using surveys to compare the results of the environmental questions from the General Social Survey (GSS) with results of those same questions from my focus group participants (General Social Survey 1993-1994, elect. comm.). The in-depth qualitative responses from the focus groups will also help shed light on the quantitative data from the surveys.

I conducted four focus groups, containing approximately five to eight residents of West Oakland. I conducted focus groups until reaching saturation, which is the point when I have heard the range of ideas and am not getting new information. Strategies for recruiting participants consisted primarily of nominations, in which leaders of community organizations announced and invited West Oakland residents to participate in a focus group. For obvious reasons, these community leaders have an advantage over recruiting participants than I do, as they have established relationships with a number of other West Oakland residents. It is necessary to note that these recruitment methods do not constitute a random sample. The results of this study are not intended to represent the entire West Oakland community, or be generalized to all communities of color and low-income individuals.

Survey questionnaires were based upon the GSS, and were administered at the end of the discussion. Although my sample will be very small and have a large margin of error, the GSS has a large sample and a small margin of error. This allowed me to make some comparisons between the two surveys despite the differences in sample size.

Along with the survey, I also asked participants to provide background data including: ethnicity, income level, and household size. Out of 25 participants, 22 were female and 3 were male. The first three focus groups consisted largely of women who were in their late twenties to late fifties, most with children. The last focus group contained younger participants that included college age participants. The majority of participants identified themselves as African American or Black, and one focus group contained two Latino participants. A translator was present to

provide translation between English and Spanish-speaking participants. I did not actively attempt to recruit women, but one reason for the uneven distribution to this demographic may be a result of the types of community groups these women were recruited from, which included health organizations such as the Asthma Coalition. Many of the organization's members were African American mothers who had asthma or had children with asthma (Gordon 2003, pers. comm.).

Qualitative Data Analysis I audio taped the focus group sessions, and a tape-based analysis with an abridged transcript was used for coding and analysis. Transcripts were analyzed using the method of narrative analysis, which involved (1) coding the data to find emergent themes, and (2) understanding and interpreting those codes to situate narratives within specific social, cultural, and institutional discourses (Coffey and Atkinson 1996). Participants' knowledge of global warming was identified and organized via concepts borrowed from Wals' (1994) three levels of perceptions: level I, which is a personalistic view of environmental problems; level II, a technocratic view; and level III, a politicized view. Participants with a personalistic view believe that pollution is mostly a local physical problem that does not have the ability to spread to distant areas. Those with a technocratic view believe that there are indirect actions which contribute to inevitable pollution. At the politicized view, environmental issues are also global issues that are the result of modern industrial society.

Statistical Techniques Although I will not be using statistical analysis for focus group data, qualitative analysis of the data will be systematic, sequential, verifiable, and continuous. The surveys were analyzed using a chi-squared test to see whether there is a difference between the West Oakland and the GSS sample population. I have also looked for differences by simple inspection and description.

Results

After conducting four focus groups in West Oakland and asking participants of their views about global warming, their responses revealed larger, encompassing views on environmental issues that went beyond the climate change issue. Four main questions relating to the issue of global warming were asked during the focus groups. I asked the following questions: (1) what does global warming mean?; (2) is global warming negative or positive?; (3) does global warming affect your life?; and (4) what are solutions to global warming? The results of the focus groups are organized and presented around these four questions and emergent themes. Only the

most significant survey results are presented in this section. This includes survey questions that revealed a significant difference between West Oakland residents and the GSS sample.

The Meaning of "Global Warming" The majority of participants had heard the phrase "global warming" before, though there were exceptions; a few heard it for the first time on the day of the focus group. When I asked participants what ideas came to mind when someone says "global warming" a recurring idea was the ozone layer, or a protective layer that covers the earth.

Emily: What's the first thing that pops into your head when you hear "global warming?"
Female voice: The ozone layer.
Emily: What do you mean by that?
Female voice: We think about the air we breathe and here on earth, all the chemicals from all different types of sources. I know that there used to be aerosol spray deodorant, but not anymore. All this gets to the air, and the chemicals go up in the air so that it does something to the ozone layer. (Focus group 2)

Another participant associates global warming with a protective strip that was being destroyed. She also questions whether it is the effects of chemicals that are harming the "strip."

Female voice: You know the global warming that they say, you know the strip that is protectin' around the earth, is it actually dissolving? Does that have something to do with it? You just really don't know and then every time you look around they addin' chemicals to things to try to kill it. (Focus group 3)

Focus group participants also associated global warming with changes in weather patterns or extreme weather events.

Female voice: Different climates I think have to play a big part too. Because a lot of times you would think that it would be summer time and it seems like winter time in different places in the world; where you would expect one type of climate it suddenly changes, and for instance it might be summer and here it is you know almost freezing. (Focus group 3)

The participant's use of the word "climate" here indicates she equates climate change with weather change. She takes a local weather aberration (freezing weather in Oakland) and compares it with what she expects (summer weather). Similarly, another participant notes unusual changes in weather and the expectation of snow in Oakland.

Female voice: …Which makes it really really hot and humid, and when it's cold it's really really freezing. I'm surprised it didn't snow this winter here in Oakland. It should have but it didn't. (Focus group 2)

Several participants expressed confusion about what exactly causes global warming, especially whether it was natural or man-made. After commenting about Lake Tahoe's water contamination, one participant asks where this environmental degradation comes from.

Female voice: So what is causing all this contamination? You don't know if it's actually the chemicals or if it's something from the atmosphere. (Focus group 3)

Female voice: You know, what's causing all the changes to the environment? Is it something we really really should be that fearful of? Because if the protective layer is removed, that means what? The earth is gonna burn up? (Focus group 3)

Not only did participants question the cause of global warming, they asked what would happen to them if it was not stopped. These were not rhetorical questions; participants would ask me during the focus group and expected answers.

Is Global Warming Negative or Positive? When I asked participants whether global warming was harmful or beneficial, a variety of responses followed. Initially, one participant expressed negative reactions but later conceded that global warming had benefits. Many thought that global warming had negative effects on health and the environment, but benefits relating to job creation and modern lifestyle conveniences.

Emily: Do you think global warming is good or bad?
Male Voice: I think it's bad. It's not normal.
Emily: In what way is it not normal?
Male Voice: The plantations, it's damages the growth of plants.
Male Voice: *[later in the discussion]* It's good because we need more forms of work but we have to know what's going to happen in the future. (Focus group 2)

Female Voice: There was a factory, and I guess with industry they have a lot of effects on the environment. Like say there was a [Red Star] yeast company over there, and I don't know if that causes global warming, but it was a nuisance to the community, it was causing people to get sick. But at the same time it was convenient to have a yeast company, it was convenient for somebody, to have that company there and to be processing those goods. So that was an advantage. And it brought jobs to the community and things like that. (Focus group 2)

To another participant, global warming had decidedly negative effects on jobs and natural resources, such as the sturgeon and bass stocks in the bay.

Female Voice: To me, in a bad way. I mean, you know, the weather's changin' it's different than what it used to be years ago. When I had my family, my husband was a big fisherman and he'd catch a lot of sturgeon and bass out in the bay. And the fish was okay then, now it's not. (Focus group 3)

The same woman who mentions the Red Star Yeast company, also points out that global warming must be a serious problem if it is a worldwide concern that other governments are also addressing through regulatory actions.

Female Voice: …It's got to be bad if the government, not just this government, but if everybody's getting involved saying you can't have this now. There's more regulation on things, so it's obviously bad. (Focus group 2)

Participants readily acknowledged the negative effects of global warming but seemed to go back and forth on whether it was ultimately harmful or beneficial. This is especially interesting

considering participants' responses to the next question, which prompted many concerns about health.

Global Warming Affects My Life One of the most frequent responses to this question was: health. Comments ranged from asthma and cancer to worldwide epidemics like SARS. The question of who is affected was also mentioned on two levels: the regional and spatial level, and from the generational perspective.

Female Voice: You didn't hear that many people talking about asthma twenty years ago. Now everybody, I bet you there are five people in this room that has an inhaler. I can guarantee. But if you don't have one, someone in your house does. That was unheard of [before]. (Focus group 3)

Female Voice: But even though the air is better there [in the hills], global warming is affecting everybody. I think it's just more on a concentrated level as far as the effects, but eventually what's coming down here is going to go there too, so everybody is affected. But it's just we're going to die quicker than them. They're getting the problems too, but it's quicker here. (Focus group 2)

Female Voice: …if it don't hurt us it's gonna hurt our children and our grandchildren. (Focus group 3)

Participants were very vocal and assertive in their beliefs that global warming had negative effects for their personal lives and for the world. Yet, despite these frequently emotional reactions, participants expressed powerlessness and uncertainty of what solutions to these problems were.

Solutions to Global Warming One woman in particular emphasized the fear that there was no viable solution, that it was "too late" to stop global warming or the activities that contribute to it. Other participants felt strongly that government and scientists could not be trusted to find a solution, or to even be honest with the public.

Female Voice: That's what I'm saying, is it too late? Because we can't change those things now, we can't go back to riding horses or putting everyone out in the fields and working on the farms because we can't do that. We've gone too far… (Focus group 2)

Female Voice: And then when you hear people talk about global warming and other things that's supposed to be happening, you want to know actually are they really bein' truthful. Are they holding something back? What kind of research are they doin'? Are they really open with that research? (Focus group 3)

Emily: So you said that's just the way things are. Do you think that there's not much we can do to stop it [global warming]?

Female Voice: I think it's too late. There's not too much to do to stop it now, it gives scientists something to write on to, but it doesn't mean they're going to be successful. (Focus group 3)

Some participants did suggest solutions in the forms of government regulations, punishing corporations, and alternative energy policy.

Female Voice: That's where [Richmond] you got those big Chevron oil that uses chemicals that has byproducts and that stuff is burned up in the air, and you have accidents happen, and you get more in the air than you're supposed to. So the government can have some control. (Focus group 2)

Male Voice: We need actions to change things: stronger regulations, force alternative energy, force Detroit to change to hybrids, electric cars. (Focus group 4).

Participants' responses to this question suggest a lack of involvement in the solution process. Few participants refer to direct actions they can personally take to address global warming issues, instead they mention government, scientists, researchers and industry. While people did suggest specific measures such as investment in hybrids and electric cars, they did not give specific examples of how the average citizen in West Oakland could address global warming. Overall results for each question have thematic associations (Fig. 1).

		Emerging Themes		
Q. 1	*What does global warming mean?*	ozone layer depletion	chemicals and pesticides	unusual or extreme weather
Q. 2	*Is global warming negative or positive?*	(-) health & environmental problems	(+) economic growth	(+) modern conveniences
Q. 3	*Does global warming affect your life?*	health-related effects	regulations	future generations
Q. 4	*What are solutions to global warming?*	uncertainty of solutions	"It's too late"	government regulations on industry

Figure 1.

Surveys In comparing my small sample size of West Oakland residents and the large sample of the GSS, I will present only the survey questions that resulted in the most significant differences in responses. In many instances, responses were combined into categories where expected values were less than five. These survey results highlight the differences in environmental issues that a community like West Oakland will perceive as compared to the general population sampled by the GSS.

In the instance of government regulation of industry, the West Oakland sample showed a decisively contrasting response than the GSS sample (Fig. 2).

On the whole, do you think it should or should not be the government's responsibility to impose strict laws to make industry do less damage to the environment?	**West Oakland** (percentage)	**GSS** (percentage)
Definitely should be	100%	43%

Probably should be		0	39%
Probably should not be, Definitely should not be, Can't choose, No answer		0	18%
p-value = 0.000010	*Total Sample*	25	1332

Figure 2.

Another significant difference was seen in a question that asked participants how dangerous air pollution caused by industry was for their family (Fig 3).

In general, do you think that air pollution caused by industry is...		**West Oakland** (percentage)	**GSS** (percentage)
Extremely dangerous for you and your family		60%	19%
Very dangerous		32%	30%
Somewhat dangerous		8%	37%
Not very dangerous, Not dangerous at all for you and your family, Can't choose, No answer		0%	14%
p-value = 0.000031	*Total Sample*	25	2943

Figure 3.

These survey results show that in some areas of opinion, West Oakland residents consider pollution caused by industry to be a serious problem that is very dangerous for their family and definitely needs to be regulated by government.

Discussion

The focus groups with West Oakland residents demonstrated that the majority of participants had heard of global warming previously, but were unaware of the precise mechanisms that caused it. Many associated global warming with the hole in the ozone layer and changes in weather. While participants readily conceded the environmental damage as well as health problems that they saw as a result of global warming, they also viewed global warming as having beneficial effects such as creating jobs through industry. Participants also viewed themselves outside of the solution, despite admitting that their modern lifestyle contributed to global warming.

Participants significantly differed in their opinions from the GSS sample population, as shown by two survey questions. The West Oakland sample was more in favor of industry regulations and strongly believed that industry pollution was harming them. Due to the small sample size of West Oakland residents, there is a high chance of bias in my survey results. Another bias was that the environment questions that I used from the General Social Survey

were administered in 1993 and 1994, a significantly large temporal difference from 2004. My sample may have different opinions simply due to changed attitudes from ten years ago. While I cannot extract these survey results to the larger West Oakland population, they are explained in part by the focus group discussions.

Similarly, focus group results are not meant to generalize about the entire West Oakland population or to all communities of color or low-income individuals. Because two West Oakland community leaders recruited the participants for the four focus groups, biases in my data may result from recruitment of participants that already knew each other or were members of the same community organization. Biases may also have arisen due to the types of community organizations that participants were recruited from, such as the Asthma Coalition. This may have resulted in similar ideas about health concerns or the environment, or a tendency to agree with fellow community members. The group dynamics of focus group discussions may also contribute to biased data (peer pressure for example).

My discussion of results will be organized around different ways of perceiving the issue of global warming, based upon Wals (1994) study of how Detroit youth define pollution. Wals identifies three levels of thinking about pollution that can similarly be applied to the environmental issue of global warming. Based on Wals' model, focus group discussion analysis revealed three primary levels of thinking about global warming. Level I is a personalistic view, level II a technocratic view, and level III a politicized view. It is important to note that each participant cannot simply be categorized and separated into a certain perception level. Instead, participants often demonstrated multiple levels of understanding about different topics covered in the focus group discussion. Wals (1994) notes that though he suggests a hierarchy in levels of understanding, "the boundaries between these levels are fuzzy, and one and the same student can operate at different levels depending on the context of the discussion."

Level I: Global Warming is Concrete Some participants define global warming as something that can be either touched, tasted, smelled or seen. Litter, dust, debris are all substances that somehow contribute to global warming. These participants emphasize the concrete presence of global warming and concrete, simple solutions that would solve the problem of global warming.

> *Female Voice:* Another thing I think is when they tearin' all these freeways down, why don't they have curtains, or big things to catch the dust and debris? Why isn't there something there to catch that to keep it from spreadin'? While they drilling all this stuff is comin' up into the air. (Focus group 1)

Female Voice: Maybe they should start making a huge fan and blow everything away, make it [global warming] evaporate. And then we can still keep living our daily life. (Focus group 2)

Emily: Does global warming affect your life?
Female Voice: Yes, I hate the heat. When it [is] really hot, I feel really tired…When it's hot the people are angry, their mood changes. (Focus group 2)

The participants who embody this concrete, personalistic view of global warming have a fragmented understanding of environmental problems. The excerpts illustrate that these participants only consider the tangible and visible to be a part of global warming, such as dust. Global warming is a substance that can be blown away with a large fan and then disappear by evaporating. Global warming affects their life because warmer temperatures cause them physical discomfort. While these concerns may seem trivial from an academic or scientific point of view, they are very real concerns that are formed through an immediate scope of personal experience.

Level II: Global Warming Hurts the Ecosystem For some participants, global warming is more than just dust in the air or feeling hot and tired. Global warming affects many parts of the ecosystem, including fish, water resources, and the air. Global warming has indirect connections to their own actions, and there are no simple solutions. Participants who think at this level about global warming tend to use words such as: ecosystem, ozone layer, rainforest, and are aware of specific environmental problems. These individuals often see solutions as technological developments to mitigate global warming.

Female Voice: When I think about global warming I think about not only the effects of the chemicals, but also the whole ecosystem, something to do with the rainforest. Basically, from what I understand is happening, we've done so much damage to the earth that we've taken away the natural resources, the ecosystem basically is being messed with so much that now it's causing global warming where the earth is getting too hot and the layers are being decreased. (Focus group 2)

The participants who mention problems such these usually have an incomplete understanding of what these problems are, how they are caused and the effects they might have on the ecosystem. Participants who think about global warming at this level are aware of the hole in the ozone layer, but have difficulty separating it from global warming. They generally consider them to be the same problem with different names. This confusion may be explained by research which states "the ozone hole has arrived as a concept in the U.S. public's consciousness, but the greenhouse effect is entering primarily as a subset or the ozone hole phenomenon, the closest model available" (Bostrom *et al*, 1994). Ungar (2000) points out that the ozone hole resonated with easy-to-understand bridging metaphors derived from popular culture (such as the

"penetration" metaphor seen in Hollywood movies like Star Wars), while there are no such ready-made metaphors that provide a simple way to understand the science of climate change. Another cause for confusion may be the mass media's lack of accurate, detailed, or concerted coverage of the issue of global warming (Bell, 1994). Those who had a stronger grasp of the global, integrated problem of global warming are discussed in the next section.

Level III: Global Warming as a Politicized Problem From the focus group analysis there emerges a third level of thinking about global warming that was found among only a few participants from all four focus groups. This third level was the most sophisticated level in that participants recognized the fact that global warming involves people's values and the choices they make as well as environmental justice issues of environmental quality.

> *Female Voice:* Usually I find, where African American or Blacks are, there's less concern. If it was in another neighborhood, no way it would happen. Nothing would've been there. All the people down there would have been placed somewhere else. And they probably would've just used it for factories, 'cause it was junkyards, just junkyards. I was born and raised in West Oakland, so… (Focus group 3)

> *Female Voice:* Another thing would be cars, because without cars, even if you don't own a car, just by having trucks deliver your food those are conveniences, but at the same time, all these cars on the road that's a bad effect on the environment. (Focus group 2)

These participants identify areas of industrial pollution that are often sited in communities like West Oakland, low-income and primarily Black. Another participant realizes that even if we personally do not emit greenhouse gases by driving a car, our lifestyle is based upon a fossil fuel economy. At this level of perception, individuals cite community-based measures that involve life-style changes to emit less greenhouse gases. One participant gave the example of the "Spare the Air Day" campaign started in 1991 by the Bay Area Air Quality Management District, as a way to reduce car pollution. Those who thought at this level often had more suggestions for solutions that could be performed as part of an everyday lifestyle. A study by Bord *et al* (2000) suggests that real knowledge of the causes of global warming is the key determinant of behavioral intentions to address global warming. Conversely, Bulkeley (2000) maintains that lack of information is not necessarily the most significant barrier to public understanding or action; instead, she asserts that researchers need to move away from assessments of public knowledge towards analysis of public understanding.

Focus group discussions and surveys demonstrate that West Oakland residents are interested in learning about global warming issues and seek clarity and education where confusion exists. While most participants did not feel they had a strong understanding of the "science" of global

warming, they did have a strong understanding that industry and automobile pollution, which affects their daily lives, is somehow connected to global warming. This lesser understanding about the mechanics of global warming does not invalidate participants' understanding of local environmental problems, nor should it prohibit their participation in decision-making. A study of public understanding in Newcastle, Australia suggests that communication about global environmental issues such as climate change should not be regarded as a one-way flow of information needed to fill a void in public knowledge (Bulkeley, 2000).

This study has shown that participants also need to be involved in decision-making processes, where their personal, local experiences can be taken into account during climate change mitigation. Communities of color and low-income individuals are disproportionately affected by climate change, thereby increasing the need for their input and opinions about climate change. Access to information is necessary for participants to feel confident about their understanding of global warming, however, their current perceptions are also valuable and insightful portraits of the local environmental problems that are strongly linked to climate change.

Based on the findings of this study, I conclude that those engaged in climate change issues, including policy makers, scientists, and civil society, need to address this local-global connection and involve communities of color and low-income individuals who are key stakeholders in the problem of global warming. During the course of my study, West Oakland community leaders have repeatedly stated the necessity of educating their communities about global warming as it relates to their local environmental concerns. Those with access to resources (such as the media, education materials, public participation forums), need to establish relationships and partnerships with these communities to enable that education to occur. For specific local actions that can be undertaken by local governments, please refer to Epstein and Rogers' study (2004) which gives a sector-by-sector list of measures that can reduce greenhouse gas emissions in their community. Community leaders have stressed that education is just one part of the battle; community action to remove hazardous industries, tighten regulations, and improve health are the larger objectives towards making West Oakland a safe place to live, work, and play.

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