

# Precarity and Resilience: The Wellbeing of U.S. Latinos in a Time of Mounting Climate Change

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**Abstract:** This environmental epidemiology article examines the understudied issue of Latino risk in the context of climate change. The largest ethnic minority group in the U.S., Latino socioeconomic characteristics put them disproportionately in harm's way for the adverse health impacts of climate change, including being subject to diverse forms of discrimination in gaining access to government resources for prevention and recovery from climate impacts. The specific ways climate change is experienced in Latino communities varies by physical location, employment and residence patterns, and community resilience. Failure to address the threat of climate change, and to identify the specific needs of those who are most vulnerable, including not including them directly in preparedness planning, enhances the likelihood that official responses to climate change will perpetuate historic patterns of denial of Latino concerns about the environment, and existing patterns of inequality, and widen prevailing differences in climate-driven adversity.

**Keywords:** Climate change, precarity, vulnerability, resilience, Latino.

## 1. INTRODUCTION

Climate change is an issue of critical importance for both public health and social equity because of its diverse negative health and social consequences overall and disproportionate impact on vulnerable and socially marginalized populations [1]. Research suggests that Latinos in the U.S are disproportionately at health and other risk compared to the majority population in a time of climate change. Yet, despite now being the largest ethnic minority population in the U.S., Latino understandings, attitudes, and responses to climate change have not been studied in any depth. This neglect is of critical importance because climate change is now being defined as “the biggest global health threat of the 21st century” [2]. Moreover, the Latino population of the U.S., because of its youthfulness, will be coming of age in – and must contend with the adverse effects of – an ever warmer and less hospitable planet [3].

It bears emphasizing that neither Latinos nor climate change are uniform. Latinos constitute a varied grouping, lumped together culturally by shared historic origins in Latina America, including parts of the U.S. that once were part of Mexico. In terms of language, income, place of residence, education, level of acculturation, religion and many other characteristics Latinos are quite diverse, and yet for many individuals being Latino (or Hispanic) is both meaningful and important [4]. Climate change also is a complex amalgam of linked differences, expressed variously in

diverse regional locations, including a range that runs from extreme drought to severe flooding, and crosses multiple climato-environmental domains [5]. In this review article, I examine the interface of these two complex entities to present an assessment of the impacts of climate change on Latino populations in the U.S. currently and into the future.

My approach is informed by the socioecological model of the human/climate relationship [6]. This framework posits the importance of three linked concepts: precarity, perceived vulnerability, and resilience. In her work, philosopher Judith Butler [7] makes a distinction between ‘precariousness’ and precarity. Precariousness refers to the fact that everyone gets sick, everyone dies, even the wealthy and social elites. While the precariousness of life is shared by all mortal beings, there is a particular ‘precarity’ imposed on the poor and the disenfranchised by social elites including marginalized ethnic minority populations. Precarity is unevenly distributed with consequence for the precariousness of life for the poor and disadvantaged. In this sense, climate change is not just a feature of a transforming environment; it is both an expression of social inequality and a force in the enhancement of social inequality with grave consequence for the lives and wellbeing of Latinos and other subordinate social groups. In this process, as adverse climate-related events from deadly heat waves to intense storms become more common, people’s sense of vulnerability and environmental uncertainty are magnified. As people are subjected to sequential and over-lapping climate-related environmental adversities, their sense of everyday and future security diminish and, as is already occurring, this is

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disproportionately common among the poor and those with fewer resources to cope with mounting environmental challenges [8]. At the same time, communities with long experiences facing harsh conditions tend to develop internal strengths that can be called on in times of enhanced threat, a capacity that has been termed resilience. As defined by Edwards [9] this term refers to the ability “of an individual, community or system to adapt in order to sustain an acceptable level of function, structure, and identity.” The notion of community resilience refers specifically to the preparedness of a group of people to mobilize their collective skills, knowledge, and resources to handle the consequence of emergencies and other challenges [10]. Part of the assessment of Latino health and wellbeing in a time of global warming must include an examination of their capacity for resilient response.

The socioecological model conceives of climate change-related impacts as diverse, interactive, and generative of insecurity experiences while emphasizing the significance of dynamic interactions of communities with their environments, of anthropogenic climatic factors with anthropogenic environmental factors, and of people with each other in social structures embedded within climato-environmental settings. In light of this theoretical orientation, my objectives are to examine the ethnic history of environmental attitudes in the U.S., including elite conceptions embedded in conservationist efforts to protect the environment, report recent findings from several national surveys that begin to reveal Latino experiences with and concerns about climate change, discuss results from the few available case studies on Latino wellbeing and climate change, and appraise the reasons why climate change must be a core Latino public issue. The ultimate goal of this review is to promote and inform efforts to increase awareness of the special impacts of climate change on the Latino population, as well as to increase the volume of the Latino voice in climate change preparedness. The robustness of this review is constrained by the narrowness of available sources. Identification of published literature discussed in this paper was driven by multiple searches of the academic research literature, government reports, non-government organization documents, and media accounts using an array of keywords and phrases (e.g., Latinos and climate change, Hispanics and global warming, Latinos and the environment, environmental racism, environmental justice).

## 2. THE ETHNIC HISTORY OF U.S. ENVIRONMENTAL CONCERN

As political scientist Gabriel Sanchez [11] observes, “There’s a stereotype that Latinos are not aware of or concerned about these issues.” Presumed disinterest in climate change among Latinos is based on the notions that: (1) environmental concern is primarily a non-Latino White, middle class issue; and (2) Latinos are focused on other, more basic, survival issues that are immediately at hand. These assumptions, it is argued here, are rooted in the ethnic history of environmentalism.

Currently there is a substantial level of environmental concern in mainstream U.S. society, a development that has been called the “new environmentalism” [12], although there also is a political empowered opposition, dubbed the anti-environmental movement, that views environmental protection as a drag on economic expansion and the creation of private wealth [13]. The new environmentalist mind set has its roots in the work and legacy of early U.S. conservationists like John Muir [14]. An initial expression of this perspective was expressed in a cultural development known as nature tourism, which “initially took off in Western Europe and North America over the course of the nineteenth century” [15] and led directly to John Muir’s “quasi-religious paeans to wilderness that ultimately helped to create the first national parks.” At the core of Muir’s conception, as expressed in the approach of the Sierra Club, which he co-founded, is the dual idea that nature should be both protected and enjoyed. Muir used this perspective to successfully lobby Congress to establish reserves like Yosemite National Park where people could “experience nature” through participatory engagement but in which nature could be protected from the harms of prolonged human presence [16].

For all his deep affection for nature, however, embedded in Muir’s majestic view of the wild was a less than friendly attitude towards the indigenous ethnic minority peoples he encountered there. Observes, Wakefield [16], Muir portrayed native peoples as heathens and their culture as backwards. Although Muir’s view of Native Americans included some contradictory ideas, “The pedestal of John Muir’s Nature [nonetheless] was too high for the Indian to attain, and his ‘uncivilized’ behavior... kept him from being an equal of the white” [16]. This view led Muir to believe that the indigenous people of the Yosemite area were not capable of appreciating the splendor of the wild and thus they had “no right place in the

landscape” [17]. This conclusion reflected the reigning “elite discourse about conservation” [18] that rationalized the use of an array of exclusionary practices.

The ethnic and related anti-urban attitudes embraced by Muir were absorbed by the national environmental movement that emerged from his efforts. Moreover, “much of the current writing on environmental conflicts and/or activism does not adequately acknowledge the socio-economic power relations that underlie many human/nature interactions” [19]. For the most part, environmental groups were long comprised only of wealthy, white, males members who harbored anti-urban attitudes and class biases. Environmentalism in the U.S., in other words, began as a campaign by the privileged classes to preserve areas for their personal outdoor amusement and recreation. Moreover, “working class individuals and ethnic minorities were generally excluded from conservation and preservation organizations” [20].

Such attitudes were not quick to wither away [21]. Thus the Center for Diversity and the Environment [22] reported that in 2007 33% of environmental organizations in the U.S. lacked a person of color on their staffs, while only 9% of the board members of natural resource organizations were people of color in a country in which over one third of the population reports being non-White. More recently, Taylor [23] found that despite a growth in the percentage of ethnic minorities working in environmental organizations, the fraction of non-Whites on their boards or general staffs does not exceed 16%. Adds Mark [24], “The unbearable whiteness of the green movement” is reflected in the traditional tendency of environmental groups to neglect issues of environmental racism and injustice. As discussed below, in recent years, this pattern has begun to change as a result of movements for environmental justice in ethnic minority communities and a corresponding effort of environmental groups to address issues of environmental equity.

A central element of the environmentalist narrative traditionally has been a view of cities as parasites. This attitude had a discernible impact on post-World War II urban planning and residential aspiration. Inherent in White retreat from the city was a threefold understanding that: (1) urban areas were crowded, congested, confining, and polluted; (2) cities were populated by menacing poor and people of color (who themselves were seen in some cases as a form of pollution); and (3) suburbia offered open spaces where

one could live closer to “nature” or at least further away from low-income and ethnic minority urbanites. Argues Pulido [25], both the desires that fueled post-war suburbanization and the siting of polluting industries near poor or minority communities (and away from wealthier, white areas) are lesser and more overt forms of a common sentiment – environmental racism.

Stereotypic beliefs about a lack of minority interest in or concern about the environment was reflected in early research that found that while 10% of non-Latino White survey participants said they went camping in the summer, the percent of ethnic minorities who went camping was “too small to be significant” [26]; non-Latino Whites were much more likely to go bird watching than ethnic minorities [27]; and non-Latino White respondents were more likely than non-White respondents to say they went driving for pleasure, swimming, sightseeing, boating, taking nature walks, camping, skiing, and hiking [28]. While the authors of such studies often recognized the role income played in influencing recreational activities, they did not tend to explore the ways in which racism, discrimination, and other institutional barriers limited ethnic minority participation. Rather, they relied on culturalist explanations that stressed that “culture may limit participation through norms of behavior which originate in religion, color, legal restrictions, male-female role prescriptions, and other traditions or customs which provide a behavior pattern” [28].

As noted, absolute denial of ethnic minority concern about the environment was rendered implausible with the rise of the environmental justice movement in the last decade of the 20<sup>th</sup> century. Unlike not-Latino White understandings of the environment which draw on 19<sup>th</sup> Transcendental ideas of people like Muir, Emerson and Thoreau, Latinos and other ethnic minorities formed their perspectives based on their direct and often harsh experiences of racism, land appropriation, the destruction of communities, and the locating of hazardous waste sites near poor residences, as well as in social justice struggles across several centuries. Since the earliest environmental justice studies during the 1960s–1980s, significant disparities in exposures to environmental risks by socioeconomic status and ethnicity have been fully documented [29]. Commonly, however, environmental concerns—like lack of access to parks and playgrounds, inadequate sanitation facilities, lead poisoning, exposure to pesticides and other occupational hazards—were not framed in ethnic minority communities as environmental issues per se but rather as matters of civil rights and social justice

[30]. By the 1980s, the movement had intensified its focus on exposure to environmental hazards [31]. Ultimately, these struggles informed the creation of the Chicano movement and similar efforts in other ethnic minority communities during the 1960/70s. Subsequently, the National Assembly of the League of United Latin American Citizens (LULAC), the nation's oldest and largest Latino civil rights organization, passed an environmental justice resolution committing the group to fight for access to clean water, air, and food [32]. The environmental justice movement has now impacted the manner in which mainstream environmentalists think about the environment, including enhanced recognition of the disproportionate adverse effects on ethnic minority communities of anthropogenic environmental and climate change. This new equity-based environmentalism is reflected in collaborations between conservation and Latino organizations and activists [33-35] and by the formation of organizations like the Center for Diversity and the Environment that are committed to transforming the ethnic composition of the U.S. environmental movement at all levels. The actual depth of concern about environmental issues in Latino communities is suggested by a set of surveys that have been conducted in recent years.

### 3. CLIMATIC AND ENVIRONMENTAL SURVEYS

Public knowledge, attitudes, and behaviors regarding climate change have been surveyed multiple times since the mid-1990s. While polling of this sort is useful, a limitation of these studies is their common reliance on telephone interviews, which tend to exclude the poorest and most mobile sectors of the Latino population. Additionally, potential participants usually had to be registered voters, again leaving out sectors of the Latino population that are blocked from voting, are mobile, have grown disenchanted with electoral politics, or failed to register for another reason. Nonetheless, one consistent finding across multiple surveys is that Latinos express greater concern about climate change and other environmental issues than non-Latino White respondents.

Exemplary is a collaborative study carried out by the Sierra Club and the National Council of La Raza [36], using focus groups and a national telephone poll of registered Latino voters in June, 2012. Overall, the study found that Latino voters are in strong support of clean energy, express great concern about the public health effects of fossil fuel use, and believe that global climate change is happening. Specifically, over three-

fourths (77%) of Latino voters recognized that climate change is already occurring (and an additional 15% reported that it would begin in the future), significantly more than the general population (52%) based on a national survey conducted by the Gallup Poll [37] at about the same time.

This pattern also was seen in Global Warming National Poll of adults across the U.S. contacted by telephone in January, 2015 using randomly selected phone numbers. The poll, conducted by New York Times and collaborators [38], found that 37% of non-Latino Whites felt that global warming was extremely or very important to them personally, compared to 54% of Latino who expressed this perspective. Similarly, while 29% of non-Latino Whites strongly agree that if nothing is done to reduce global warming it will hurt them personally, 40% Latinos voiced this concern. Latinos also were more inclined to believe that the U.S. government should take action to limit global warming (63% vs 49% respectively expressed strong agreement).

Finally, during June and July, 2015, EarthJustice and Green Latinos [39] polled a national sample of Latino registered voters. The majority (76%) indicated that they believe it is very or even extremely important that the federal government set standards to prevent global warming. A similar percentage (74%) reported that they were at least somewhat worried about global warming. A majority (66%) believed that global warming is caused by human actions, and only a tiny percentage (3%) denied that global warming is occurring. Finally, 84% indicated that they were interested in learning more about how they and their families can protect the environment.

Whatever the limitations of these surveys, together they point to higher levels of concern about climate change among Latinos compared to the dominant population. Rather than being disinterested because they are focused on the survival issues that they must face every day, Latinos appear to recognize more than the non-Latino population that they are not protected from the impacts of a changing climate.

### 4. CASE STUDIES OF LATINOS AND ENVIRONMENTAL CONCERN

Ethnographic and other case study research on specific Latino communities and their encounter with climate change unfortunately is quite limited. The research of this sort that is available highlights the importance of examining the interface of climate-

generated physical conditions with the specific array of on-the-ground socio environmental factors that characterize a community. The importance of this interface was revealed by the 1995 Chicago heat wave that resulted in thousands of Chicagoans developing severe heat-related illnesses and suffering an excess (above normal) of 739 deaths for the week of July 14-20th. During this period, Chicago endured the deadliest stretch of extreme heat ever recorded in the U.S. Heat waves—the number one weather-related cause of death in the U.S.—are a fundamental consequence of contemporary climate change. Conditions were intense, especially in the inner city, because Chicago is a classic example of an “urban heat island” with a high concentration of heat-absorbing buildings, parking lots, and paved roads, as well as limited protective greenery. This causes cities to experience much less cooling at night than rural locations [40].

Analysis of the characteristics of those who died found that while Latinos comprise about 25% of the city’s population, and are disproportionately poor with comparatively high rates of pre-existing health problems (e.g., diabetes) that put them at special risk, they only accounted for about 2% of heat-related deaths. African Americans, who also have a high rate of poverty, by contrast, suffered a significant toll. The key difference between these two communities is revealed by the contrasts between the heavily Latino Little Village area, which had a much lower death rate than the predominantly African American North Lawndale neighborhood. While the former has a high population density, it also has a busy commercial life in the streets and vibrant public spaces; The latter is characterized by abandoned stores, isolated seniors, a breakdown of social services, and a fear of opening doors and windows because of street crime. The social ecology of abandonment, dispersion, and decay in the African American neighborhood made the systems of social support that protected Latinos very hard to sustain. As this case affirms, it is necessary to frame analysis of climate change within a geography of social vulnerability. Klinenberg [41], who studied this extreme weather event, concluded that the heat wave “was an environmentally stimulated but socially organized catastrophe”.

While urban heat waves are periodic summer events that are expected to become more frequent and more severe as a result of global warming [42], in the American southwest where semi-arid conditions prevail and water is comparatively scarce, climate-related drought presents a major threat to Latino communities

dependent on agriculture. In the region, farmers rely on the use of irrigation, infrastructural construction (e.g., dams), and government subsidies and other support. For Latino farmers and farm workers, however, lack of access to public resources and assistance has resulted in increased marginalization and diminished ability to adapt to climate change. In her ethnographic study of non-Latino White and Latino farmers and Latino farm workers, Vásquez-León [43] contrasts the ways that non-Latino White farmers can rely on the far deeper pockets of formal support structures, while Latinos must rely on informal (kin and social network) support to survive prolonged drought. In the section of Arizona where Vásquez-León did her research—the Springs Valley and Safford Valley areas—most of the farmers are non-Latino Whites, while Latinos constitute between 27 and 55% of the local populations of the two sites, only between 10 and 16% have been able to remain in farming because of drought conditions. It was the arrival of non-Latino White farmers in the 1940s and the introduction of cotton farming based on groundwater pumping that led to the creation of the *bracero* program that began an influx of farm workers from Mexico into the region. Since the 1940s, various agricultural programs (e.g., crop subsidies, federal disaster relief, and federal and private crop-insurance) have helped to reduce the vulnerability of non-Latino White farmers. Latino farmers, by contrast, are usually low-technology operators with smaller farms who must weave together various income-generating activities. Because they do not produce commodity crops, they often are not eligible for federal programs; because their farms are usually under 620 hectares, they do not qualify for credit that would enable them to buy more productive farming technologies. Moreover, they complain that they are discriminated against when they apply for low interest loans. Latino farmers do rely, however, on dense social network within the Latino community, as a source of support (including customers for their crops) in dealing with drought conditions. Overall, the value of their social networks notwithstanding, compared to non-Latino White farmers, Latino farmers have suffered disproportionately from the consequences of extreme climatic events, including being forced out of business [43].

The last group studied by Vásquez-León, farm workers, including year round field laborers, seasonal packing plant workers, and seasonal migrant workers, have the fewest resources and are the most vulnerable to climatic conditions. Social ties with labor contractors and Latino farmers provide them with one source of

potential assistance in learning about work opportunities and gaining access to specific jobs despite the prolonged drought. For the most part, they are forced to do their best to get by, using mobility as means of coping with local effects of climate change. They are at gravest risk for heat-related and other adverse impacts of climate change. As Vásquez-León's account highlights, "vulnerability is not predominantly a climate-based condition, but rather derives its significance from the interaction of climate and society" [43]. A key element of the social component of Latino farm worker precarity is the high proportion, about 25%, that lack legal status as undocumented immigrants and as a result are reluctant to report heat-related or other illnesses to their employers and who may have fraught access to health care [44].

While the first two case studies focused on socioenvironmental factors that contributed to or protected Latino communities from the local impacts of climate change, the final example, which looks at Latinos in Hartford, Connecticut, addressed people's knowledge about, experience of, and attitudes toward climate change. Participants in the study included 25 low-income self-identified Hispanics or Latinos, recruited from the client lists of a community-based social service organization [45].

Overall participants were quite aware of climate change and some of its cause, and could point to experienced transformations in weather patterns as evidence of the unpredictability being introduced by global warming. As one participant commented "the winter is getting longer, and the summer is getting here later... I mean, there's some sort of a mess in our weather." Still many were uncertain about which adverse experiences to attribute to climate change and which to other causes.

Most reported that they experienced regular feelings of precarity and health vulnerability in a world of rising temperatures and related environmental disruptions. They tended to frame their view of the changing world in terms of increasing susceptibility over time, with growing consequences for their children and for themselves as they age. Concerns about children and what life would be like for them on a warmer planet were particularly prominent in participants' comments.

Intermingled with their sense of mounting climatic uncertainty was a distinct feeling of powerlessness to do anything about it. This sentiment was expressed by one participant in noting that, "A lot of children are going to be born sick, before they are born – the

pregnant mother is experiencing all those changes, and when the child is born sick, his / her life possibilities are already being cut short. It will keep diminishing even more [over] time." Despite their sense of powerlessness. At the same time, participant expressed a strong desire to learn more about climate change and to get involved in responding to the climate-related health threats. As one participant commented to the interviewer, "I would really like it if you could make some pamphlets, or I don't know... some information in Spanish, something that could help us all, not just me, help us all, what it is, and how it is affecting us." Participants voiced a number ideas about how they could help in reducing the local effects of climate change, including getting involved in community tree planting or neighborhood clean-up efforts or in pushing the city to set up more summer cooling centers for residents who lacked air conditioning. But lack of access to climate change knowledge, they stressed, was hindering them in deciding how to respond effectively.

While it is sometimes assumed that the inner city poor are so burdened with socioeconomic challenges that they are not particularly focused on the nature and risks of climate change, the findings of this study suggest that this is not the case. While they may not have full or completely accurate information about climate change, they recognize many of the kinds of risks presented by a warming planet. Moreover, they do not seem to be befuddled by the disinformation campaigns of climate change deniers.

## **5. REASONS WHY CLIMATE CHANGE IS A LATINO ISSUE**

Existing research indicates that each particular region of the United States is experiencing, and in the future can continue to expect, varying consequences ushered in by climate change. Consequently, the issue of place is critical to the assessment of vulnerability and the impact of climate change on the approximately 58 million Latinos of the U.S. This population is dispersed across the country, but far from evenly so, with the highest numbers of Latinos residing in California, Texas, Florida, New York, Illinois, Arizona, New Jersey, Colorado, New Mexico and Georgia [4]. While important segments of the Latino population (including farmers and farm workers) reside in rural areas (i.e., approximately 7% of the total), Latinos are more urban than the rest of the nation's population. In urban areas, Latinos disproportionately hold lower-wage jobs in the construction, retail trade, and service segments of the economy. Increasingly, suburban

areas near major cities have attracted large numbers of Latinos seeking employment in the construction, meatpacking, and landscaping industries [46].

Wherever they live, Latinos tend to be exposed to a disproportionate level of climato-environment health risk. For example, research by Clark, Mille, and Marshall [47] found that ethnic minorities are exposed to concentrations of the toxic pollutant nitrogen dioxide (NO<sub>2</sub>) that are 27% higher than non-Latino White exposure. Nitrogen dioxide is linked to respiratory illness, and, like planet-warming carbon dioxide, is discharged from motor vehicle tailpipes and power plant smokestacks. Among ethnic groups, Latinos have the highest NO<sub>2</sub> exposures in both urban and rural areas. However, climate change does not hit populations living in a social void; rather, on the ground local social conditions interact with changing temperatures and local geographic factors to create vulnerability. As a result, Latinos in different parts of the country face a different mosaic of risk, have different vulnerability profiles, and possess different levels and kinds of resilience. Regional and or local variation in risk factors include.

### 5.1. Ocean Rise

The risks of coastal erosion and ocean flooding are particularly acute for Latinos living in southern Florida, as well as for those living along the west, east and gulf coasts, including large urban populations in cities like New York and Los Angeles. Over 64% of the population Miami-Dade County, Florida, for example, is Latino; while historically heavily Cuban, today they only constitute about 30% of the increasingly diverse Latino population in the area [48]. Analyses of various types of environmental data suggest that a projected 1.5 meter ocean rise by the year 2100 will inundate large sections of Miami-Dade County, sinking many Latino neighborhoods below ocean level [49]. Similarly, there are over 2 million Latinos living in New York City, more than any other metropolitan area in the United States [50]. As witnessed during Hurricane Sandy in 2012, climate-driven ocean level rise and the intensification of hurricanes and their storm surges have placed New York City at ever greater risk for flooding as the intervals between the most severe storms continues to shrink [51]. In the year after Hurricane Sandy, many New York City residents were still struggling to recover, particularly low-income and immigrant Latino families [52]. Many faced discrimination in receiving recovery assistance after the storm [53].

### 5.2. Urban Heat Island

Given the high percentage of Latinos living in cities, including in the poorer sections of cities with substandard housing and constrained resources, millions of Latinos around the country are at growing risk for urban heat island effects. This is especially the case in cities like New York, Los Angeles, Houston, San Antonio, Chicago and Phoenix, which have the largest urban Latino populations. In a study of Phoenix, for example, [54] Harlan, Brazel and Jenerett *et al.* (2007) found that affluent non-Latino Whites were more likely to live in vegetated, less climatically stressed neighborhoods than low-income Latinos. Wealthier neighborhoods had cooler summer temperatures and lower outdoor health risks, especially during a heat wave. In addition to being warmer, poorer neighborhoods lacked the kinds of critical resources in their physical and social environments that could have helped residents cope with extreme heat. Census data analysis for the Los Angeles-Long Beach Metropolitan Area, moreover, found that Latinos are much less likely to have access to air conditioning than the general population. Whites also are more than twice as likely than Latinos to have access to a car [55].

### 5.3. Drought

Over the last 15 years, a major drought has struck a large swath of the American West, including California, Arizona, Nevada, and New Mexico [56]. The Colorado River, which supplies at least 40 million people in and beyond the U.S., while irrigating four million acres of highly productive farmland, has been suffering a notable drop in its water levels. As a result, there has been widespread vegetation mortality and a sharp jump in the frequency of major wildfires. Rising temperatures appear to have played an important role in reducing the flow of water down the Colorado River since the late 1980s [57]. Existing scientific predictions are for an unrivalled Southwest mega-drought over the next century barring significant reductions in greenhouse gas emissions [58]. As this region constitutes a major Latino population center, with people ranging from farmers and farm workers in rural areas to urban dwellers in the cities that depend on the Colorado River for drinking and other household water, the risks of climate-related drought present a significant and growing threat.

### 5.4. Heat-Related Illnesses

Illness that arise because of high core body temperature—heat edema, heat cramps, heat syncope, heat exhaustion, and heat stroke—occur when the

body is exposed to and/or produces more heat than it can dissipate into the air. Working outdoors in direct sunlight and humidity, farm workers are at higher risk for heat-related illnesses than workers in most other occupations. With climate change, this risk is intensifying [59]. Moreover, exposure to certain pesticides, especially organophosphate insecticides, can produce sweating which contributing to the onset of overheating [60]. A national survey among farm workers by the U.S Department of Labor [61] found that 83% identified themselves as members of a Latino group. As seen in the case of the 1995 Chicago heat wave, it is not only farm workers who are at risk of climate change-influenced heat-related illnesses, but this group, often among the poorest of the working poor, with restricted access to regular health care and uncovered by labor law protections, is particularly put in harm's way by global warming. During the 15-year period from 1992-2006, 423 workers in agricultural and non-agricultural employment died from exposure to environmental heat. The heat-related average annual mortality rate for farm workers was 0.39 per 100,000 workers, compared with 0.02 for all U.S. civilian workers. In the years between 2003 to 2006, for which ethnic identity data are available, 71% of farm workers who died of heat-related conditions were Latino immigrants [61].

### 5.5. Extreme Storms

Coastal areas along the Gulf and up the eastern seaboard are at growing risk for climate-intensified hurricanes and tropical storms, and other threats like tsunamis. Communities on the Gulf coast have the country's highest potential for damage during the annual hurricane seasons, including storms that can destroy entire communities, such as the devastation caused by Hurricanes Katrina and Rita in 2005. In New Orleans at the time Katrina devastated the city there were two established Latino communities, one composed of people who had begun arriving from Nicaragua very early in the 20<sup>th</sup> century and the other made up of Hondurans who had begun migrating to the city in the 1920. In the aftermath of Katrina, and the demand for construction workers, the size of the Latino population of New Orleans jumped by about 45%, placing this growing population in an area where climate-driven extreme weather is likely to worsen over time [43].

### 5.6. Worsening Air Quality Caused by Atmospheric Heating

It is estimated that almost 25 million Latinos live in urban areas with the worst ground level ozone and that

14 million Latinos live in the worst urban areas for annual particulate pollution [35]. Research indicates that changes in climate variables, including temperature and atmospheric moisture, cause increases to peak ozone concentrations [63]. Ground level ozone—which can trigger a variety of health problems, particularly for children, the elderly, and people with asthma—is produced by the effect of sunlight on emissions from industrial facilities, motor vehicle exhaust, and chemical solvents. Rates of asthma have been found to be disproportionately high in the Puerto Rican population of the U.S. compared to the non-Latino White population and the other Latino populations [64], putting this subgroup of Latinos at particular risk for increasing harm from asthma.

### 5.7. Spreading Infectious Disease Vectors

Epstein [65] (2001) points out that a temperature rise of only 3.6°F would more than double the metabolism (and feeding) rate of mosquitoes, including species that spread human diseases like West Nile, dengue, and Zika. Ticks, the most significant insect disease vectors in the U.S., are known to be spreading to new areas as a result of climate change. Research consistently shows warmer temperatures increase tick abundance. During the last three decades, the recognized number of distinct and epidemiologically important tick-borne diseases has jumped considerably, largely considered a result of expanding tick habitats. Several recent reports indicate a widening spread of specific tick species in geographic areas in which infection previously was never seen [66]. Low income Latino communities are at heightened risk for mosquito-borne diseases because of older and poorer quality housing stock, lower levels of health insurance, and less access to prevention information. Tick-borne infections may be a special risk for Latinos who work out-of-doors in landscaping or agriculture. Latinos constitute a significant part of the workforce in both of these industries.

### 5.8. Extended Fire Seasons and Intensified Fires

With global warming comes higher spring and summer temperatures as well as earlier spring snow-melt, which together cause the soil to be dry for longer periods and increases the likelihood of extended wildfire seasons characterized by more intense and long-burning fires. At special risk is the western U.S. because of its prolonged drought conditions. Wildfires in this region have been increasing in frequency and duration since the mid-1980s. Significant fires in the period 1986-2003 occurred nearly four times more



often, burning more than six times the land area, and lasting almost five times as long compared to the years between 1970-1986. This dangerous trend has been linked to the regional rise in temperatures tied to global warming [67]. As indicated, the area at greatest risk for catastrophic wildfires is a national center of the U.S. Latino population. Low-income Latinos in the West have been found to be more vulnerable to natural disasters than wealthier populations because of the locations of their residences, quality of dwelling, materials used in building construction, and social exclusion from preparedness and recovery services [68].

## CONCLUSIONS

### **Precarity, Resilience, Cohesion and Adaptation Preparedness**

While climate change has implications for all sectors of the U.S. population, it does not have the same implications or present the same level and kinds of risk for all communities. Failure to address these differences, and to identify and take into consideration those facing the most immediate and gravest precarity, including not involving them directly in preparedness and adaptation planning, enhances the likelihood that official responses to climate change will perpetuate existing patterns of inequality and widen prevailing differences in perceived vulnerability [69]. It is evident from existing research that Latino concern about worsening environmental and climatic conditions is high, and exceeds that of the non-Latino White population [70]. Further, it is clear that Latinos would like to better understand climate change and to participate in efforts to ameliorate it or adapt to it. Such concern is appropriate given the fact that Latinos are disproportionately at risk despite a resilience developed through historic coping with social adversity. Additionally, as seen in the case of the 1995 Chicago heat wave, social interaction and cohesion can be critical sources of community resilience in the face of disaster [71]. Increasingly, as climate change advances, however, the frequency and intensity of climate-related adverse events and the occurrence of overlapping and mutually enhancing events (e.g., flooding that causes fires, warming that worsens air pollution) puts resiliency itself at risk [72].

Pandya [73] emphasizes that to effectively address the challenges of climate change and other anthropogenic environmental disruption we must, “add participatory approaches to the portfolio of scientific methods” by “developing and answering questions that

are driven by the needs and priorities of specific, local, diverse non-scientific communities”. Even with radical cuts in greenhouse gas emissions, climate change will continue because of past emissions. Hence, in efforts to address the current and near future the needs of the most vulnerable should take precedence in climate change preparedness [74].

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