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# Climate Justice in Urban Climate Policies in Canada and the United States

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## ABSTRACT

Throughout the United States (US) and Canada, the effects of climate change have become apparent through rising temperatures, extreme precipitation, inland flooding, rising sea levels, air pollution, and the increased frequency and intensity of extreme heat. In the face of increasing challenges to health and security, cities in the US and Canada have begun to take action to combat climate change, including through urban design. This paper provides insight into how each country has approached climate justice in urban design through an in-depth analysis of the most recent climate action plans from major urban areas in each country. I explore differences in climate hazards and responses, as well as the communities or groups included or targeted in the planning process. The analysis reveals a concerning variation in the explicit mentions of vulnerable communities and groups among cities in the US and Canada, showing a lack of coordination within and between the two countries. It is also noted that more references are made to marginalized communities in climate action plans in the US than in Canada.

## Introduction

In an era of unprecedented environmental challenges, the concept of climate justice has emerged as a pivotal consideration in urban design (Steele et al., 2015). Climate justice is an amalgamation of social equity and environmental sustainability considerations, which strives to ensure that the burdens and benefits of climate change mitigation and adaptation efforts are balanced fairly for all members of society, especially marginalized and vulnerable populations (*What Is Climate Justice? And What Can We Do Achieve It?*, n.d.). Urban design is an approach to architecture and urban planning that encompasses the planning, organization, and development of urban spaces, infrastructure layouts, zoning policies, and architectural guidelines (Elrahman & Asaad, 2021). As climate change continues to impact North America, its repercussions have grown exponentially more severe, spanning rising temperatures, the increased frequency and intensity of extreme heat, rising sea levels, precipitation variability, drought, higher ocean temperatures, ocean acidification, and shifting ecological patterns (*Chapter 14: North America*, n.d.). The frontline communities facing the escalating impacts of climate change in North America are experiencing them disproportionately. For instance, those who endure severe heat without access to air conditioning are dealing with higher rates of preventable fatalities (Randy Dotinga & Randy Dotinga, 2006). Additionally, many coastal communities have limited resources with which to defend themselves from rising sea levels (Muyskens, 2023). The Biloxi-Chitimacha-Choctaw tribe in Louisiana has seen its ancestral home on the Isle de Jean Charles in the Gulf of Mexico shrink by 98% over the past hundred years, with sea levels along the coast rising 12.7-15.2cm. Climate change has also caused harsh storms that continue to wash away more and more land (*The Biloxi-Chitimacha-Choctaw Community and Their Land*, n.d.). As these impacts continue to worsen, the importance of incorporating climate justice principles to directly address these disproportionate impacts has never been more apparent.

Urban planning and design are effective tools with which to manage climate change impacts as they can address both mitigation and adaptation (Steuteville, 2023). Incorporating climate justice into urban design

has gained momentum as municipalities set out to solve historical inequalities and support marginalized communities (Martin, 2019). Within the climate action plan of the city of Chicago, for instance, there is a clear outline of engagement, including with underserved communities. The plan offers these communities a critical voice in the city's response to climate action. Public transportation in Toronto (TTC) has taken action to counteract inequality through fare reduction and subsidy programs for low-income individuals and families, making public transportation much more accessible for all (*Fair Pass Transit Discount Program*, n.d.).

It is extremely important that climate justice issues are combatted alongside climate change. Activists and city residents are demanding long-term equitable measures. However, there has not been any research into the extent to which cities are meeting that demand or the methods by which they are incorporating equity into urban design plans. This paper will explore how ten cities in the US and Canada are integrating climate justice into city planning across different hazards and through various responses and forms of equity action planning. This paper will shed light on the progress made by these cities in confronting climate justice concerns and the varied success of their diverse approaches.

## The Context of Climate Adaptation in the US and Canada

The US is the third-largest country in the world, with a total area of 3,199,885 square miles (Gopnik et al., 2023). It is known for its diverse geography, varied climates, and multiculturalism (Gopnik et al., 2023). The country's fight against climate change has been a long and complex battle.

Since 1850, the US has been emitting more greenhouse gasses than any other country, contributing 20% of the global total of carbon dioxide (*Greenhouse Gas (GHG) Emissions | Climate Watch*, n.d.). Since 1970, the country has warmed by more than 1.4°C (*Earth Day: U.S. Warming Rankings*, 2022). Over the years, the impact of climate change has become more profound and can now be felt by millions of Americans. Heatwaves have become a common occurrence, droughts in the southwest have worsened (Andreadis & Lettenmaier, 2006), and sea levels have risen to a point where 40% of the US population living near the coast is vulnerable (*Climate Change: Global Sea Level*, 2022). The thinning of sea ice has put Alaskan tribes relying on hunting at risk, and an increase in the intensity of hurricanes has put other citizens in danger (Center for Climate and Energy Solutions, 2023).

In recent years, heat waves have risen in frequency from an average of two per year in the 1960s to more than six per year in the 2020s, and the heat wave season has grown longer (*Heat Waves*, n.d.). The increase in heat waves has borne a serious health impact as extreme heat triggers a variety of heat stress conditions, such as heat stroke. Heat stroke occurs when the body cannot regulate its temperature and begins to heat rapidly without the ability to cool itself down. This condition can cause permanent disability or death. Cities across the US, such as St. Louis, Philadelphia, Chicago, and Cincinnati, have been dealing with a growing number of deaths from heat waves (US Department of Health and Human Services Centers for Disease Control and Prevention & American Health Association, n.d.). In 2018, a total of 1,008 Americans died from direct heat exposure (USAFacts, n.d.). It is estimated that about 12.2 million people, nearly 4% of the population, live in areas with dangerous levels of heat (Bloch et al., 2023). The impact of heat waves is particularly felt within low-income communities and communities of color. For example, during the 1995 Chicago heat wave, most of the victims were impoverished elderly people who had no air conditioning or had air conditioning but were unable to turn it on. Many of these people were hesitant to open their doors for fear of crime, which resulted in the death of 739 people over five days (Beer, 2023). Epidemiologic analysis showed that black residents were more likely to die than white residents during the 1995 heat wave (Kaiser et al., 2007).

Hurricanes have also become more frequent and intense globally, and this has had a significant impact on the US. Hurricanes are steadily growing far more costly in terms of both physical damage and deaths (Center for Climate and Energy Solutions, 2023). Hurricane Katrina and Hurricane Harvey have emphasized the need

for the US to take action against climate change to protect increasingly vulnerable coastal communities. Hurricane Katrina was a Category 5 hurricane that caused 1,836 fatalities and an estimated $97.4 billion to $145.5 billion in damage to the city of New Orleans (D. Knabb, et al., 2023). Hurricane Katrina flooded the streets, destroyed buildings, and killed thousands of people, particularly people from low-income communities and communities of color. The rates of death among black residents were 1.7-4 times higher than for white residents (Brunkard et al., 2008).

As the temperature in the US and the world increases, large ice fields in Alaska are melting at an alarming rate. Alaska currently accounts for 25% of ice loss from global glaciers, losing about 66.7 billion tons of ice each year (AntarcticGlaciers.org, 2023). At this rate, all glaciers in Alaska will have disappeared in 250 years (AntarcticGlaciers.org, 2023). Indigenous communities living in Alaska are one of many groups bearing the consequences of the melting glaciers. Eighty percent of the diet of these indigenous groups comes from their immediate surroundings (Weinhold, 2010).

Much like the US, Canada is a country with vast, diverse terrain, multiculturalism, and varied climates. Canada is the second-largest country in the world, occupying about two-fifths of the continent of North America. Though Canada is a large nation, its population is sparse (Bercuson et al., 2023).

Canada is currently warming faster than the rest of the world, at nearly twice the global rate, while the Canadian Arctic is warming even faster, at three times the global rate (Canada, 2023). Since 1948, Canada's average temperature has increased by 1.7°C, while in the north the temperature has risen by 2.3 °C (E. a. C. C. Canada, 2019). The rapid warming in the Canadian Arctic, sea-ice deterioration, and changes in permafrost are posing a grave threat to communities and infrastructure in the North. Canada is surrounded by three oceans: the Pacific, the Arctic, and the Atlantic, which puts the country at risk of flooding. Canadian forestry is also greatly affected by climate change, including through the growth and mortality rates of trees (Canada, 2022). With rising temperatures, wildfires in Canada have become more common and have affected the health of thousands. In 2023, the country dealt with its worst wildfire season, with no region going untouched (Carty, 2023). By September 4, 2023, Canada had reported 6,118 wildfires, which had reduced 15 million hectares to ashes, doubling the previous record of 7.6 million hectares in 1989 (Carty, 2023). Wildfire smoke was carried hundreds or thousands of kilometers from the fire zone and affected the health of many Canadian communities, especially vulnerable people, including seniors, pregnant people, and infants, putting them at risk (E. a. C. C. Canada, 2023).

It is estimated that 4 million Canadians are living in areas that have already been affected by flooding, and that 10% of all Canadian homes will become uninsurable because of climate change (Browne, 2023). The flood in British Columbia in 2021 caused at least $450 million dollars in damage to communities that couldn't afford repairs (Browne, 2023), and residents in British Columbia are having difficulty getting insurance for flood damage. Damage done by floods is not going away, with high-tide floods expected to increase significantly in mid-2030, with some coastal communities expecting 10 to 15 floods a month (Tides of Change: Climate Change and Flooding in Canada | Marsh, n.d.).

Climate change affects all Canadians, but the distribution of damage is not equal, with impacts felt most by First Nations, Inuit, and Métis peoples. The impact of climate change doesn't just affect their physical health, but also their emotional, spiritual, psychological, and cultural well-being. These health impacts are far-reaching, from diminished food and water security to infrastructure damage to threats against personal safety and mental health (National Collaboration Center for Indigenous Health, 2022).

## Research Objectives

The primary objective of this paper is to evaluate the extent to which climate justice is incorporated into urban governance for cities in the US and Canada. Specifically, the study aims to analyze and compare both countries'

incorporation of climate justice in major urban area designs. I focus on the following research objectives to synthesize the current extent of climate justice in urban governance:

1. How much and in what ways is climate justice incorporated into urban governance?
2. Which climate hazards are cities responding to?
3. How are cities responding to these hazards?
4. How do Canada and the US differ in their approach to climate justice?

## Methodology

In order to answer the aforementioned research questions, I conducted a systematic review undertaken via the coding of hundreds of pages of the most recent climate action plans of Canadian and US cities with similar climate justice concerns, population sizes, geographical sizes, and climate challenges. Specifically, I analyzed the climate action plans of the US cities of New Orleans, Denver, Chicago, Seattle, and Boston and the Canadian cities of Halifax, Calgary, Toronto, Vancouver, and Montreal. Each plan was coded across several key criteria, including equity in planning (whether the plan explicitly mentions thought partnerships with marginalized individuals or groups), equity in targeting (whether the plan explicitly mentions marginalized groups as recipients or beneficiaries of the relevant policy), response type (e.g., behavioral, ecosystem based, institutional, technological), sector (the kind of industry implicated by the policy), climate hazard (e.g., rising sea levels, extreme heat, drought, loss of arctic sea ice), and specific adaptation goals designated by local governments. Results were coded based on keywords. For example, heat waves were coded to identify references to increases in the frequency and intensity of extreme heat. In order to quantitatively compare across cities, results are converted to points, with an overall score assigned to each city. City scores are averaged to an overall score for each country. This methodology allows for a detailed comparison of the adoption of climate justice principles in the urban design in the cities of each country.

## Results

Raw totals of each criterion per city are depicted in Table 1. As demonstrated, climate adaptation in both Canada and the US occurs primarily in response to general climate impacts (86.67%), extreme precipitation (3.14%), and the increased frequency and intensity of extreme heat (2.75%). The least prevalent hazards were increased precipitation variability (1.18%), and rising sea levels (0.78%). There are no explicit mentions of droughts, rising ocean temperatures, or acidification.

Response type was coded based on the broad category of response such as technological/infrastructure (e.g. building retrofit, construction of electrical stations), institutional (e.g. finance, policy, health care), ecosystem-based (e.g. ecosystem restoration, nature conservation), and behavioral and cultural (e.g. community engagement, partnerships) (Table 2). For example, the renovation of an existing building was coded as a technological/infrastructure response. In the total raw figure counts, a single item may include multiple characteristics and be counted several times in the results. The most common response to climate hazards in both countries were technological/infrastructure responses at 53.33%, with institutional responses following with 30.59 %. The least prevalent response to climate hazards were ecosystem-based responses, at 5.88 %, and behavioral and cultural forms of adaptation at 10.20%.

Sector response results were also coded based on keywords. For example, the purchase of an electrical bus was coded as a transportation sector response. Raw codes for the response sector for climate adaptation can be found on Table 3. The primary response sectors for climate adaptation in Canada and the US are building code/energy efficiency (27.45 %) (e.g. light efficiency, renewable energy, insulation installation), and transpor-

tation (20.78%) (e.g. public transportation, electrical vehicles, grand fleet management). Other responses included finance (7.45%) (e.g. investment, financial management, small business loans), community development and engagement (9.41%) (e.g. curriculum reform, youth organizations), ecological restoration/conservation (e.g. forest restoration, forest conservation, park creation initiatives), waste management (5.88 %) (e.g. landfill, recycling project), and city government (e.g. 7.84%) (e.g. assessment plans, resilience plans, city climate action plans). The least prevalent sectors include urban development (5.10%) (e.g. zoning, greenspace), carbon budgeting (2.35%) (e.g. financial expenditures, carbon budgets), advocacy, climate resilience (1.96 %) (e.g. economic development, affordable housing), public health (2.75%) (e.g. air quality, infrastructure, extreme heat), and agriculture (1.57%) (e.g. farming).

As seen in Table 4, the largest targeted groups were general city residents (e.g. Bostonians, Vancouverites, Torontonians) (73.33%), low-income communities (e.g. $14,580 annually for one person and $30,000 for a family of four) (6.67%) and vulnerable populations (e.g. a non-specific grouping of multiple marginalized groups) (5.10%). The least commonly targeted groups were indigenous (0.78%), African Americans (1.57%), businesses (1.57%), children (0.78%), cyclists (0.78%), the elderly (0.78%), Equity-Deserving Communities (2.75%), freight drivers (0.39%), Frontline communities (2.35%), African Canadians (0.39%), youth (0.78%), and government (1.57%).[1] Canada mentions specified equity targets in 20.8% of policies, while the US mentions them in 36% of policies.

In table 7, the total raw figures for explicit references to community targeting is categorized under "at-risk communities" and then divided by the totals number of equity in targeting in each city. Subsequently, the percentage that explicitly references "at-risk Communities" is computed to reveal the following results:

1. Chicago mentions equity targets in 63% of cases.
2. Halifax mentions equity targets in 31% of cases.
3. Toronto mentions equity targets in 27.27% of cases.
4. Denver mentions equity targets in 25% of cases.
5. Boston mentions equity targets in 8.3% of cases.
6. Calgary mentions equity targets in 5% of cases
7. Seattle mentions equity targets in 4% of cases.
8. Montreal mentions equity targets in 1.07% of cases.

The number of mentions of equity in city planning varies across the given cities; there is no specific pattern and, while it is important to note that attention is needed to incorporate marginalized groups in policy planning, an analysis on this variable indicating a trend amongst cities with more or less of such mentions is not possible in this context. (Table 4). The tables associated with all of the aforementioned results below can be found in the appendix to this paper.

[1] The total number of mentioned equity targets was reduced by 17 observations due to a lack of identification of the type of response being targeted.

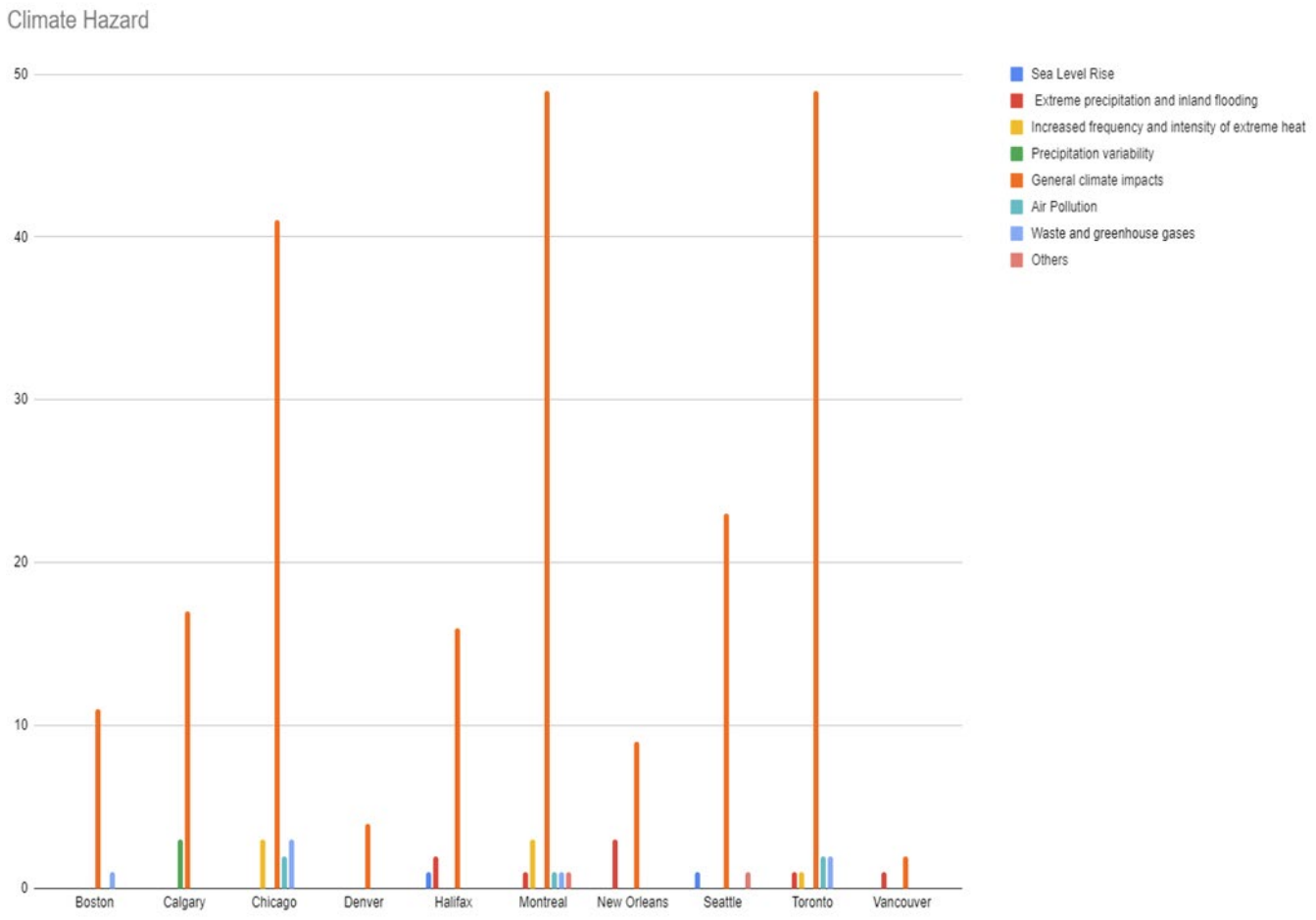


**Figure 1.** Climate change hazards facing 10 major cities in the US and Canada

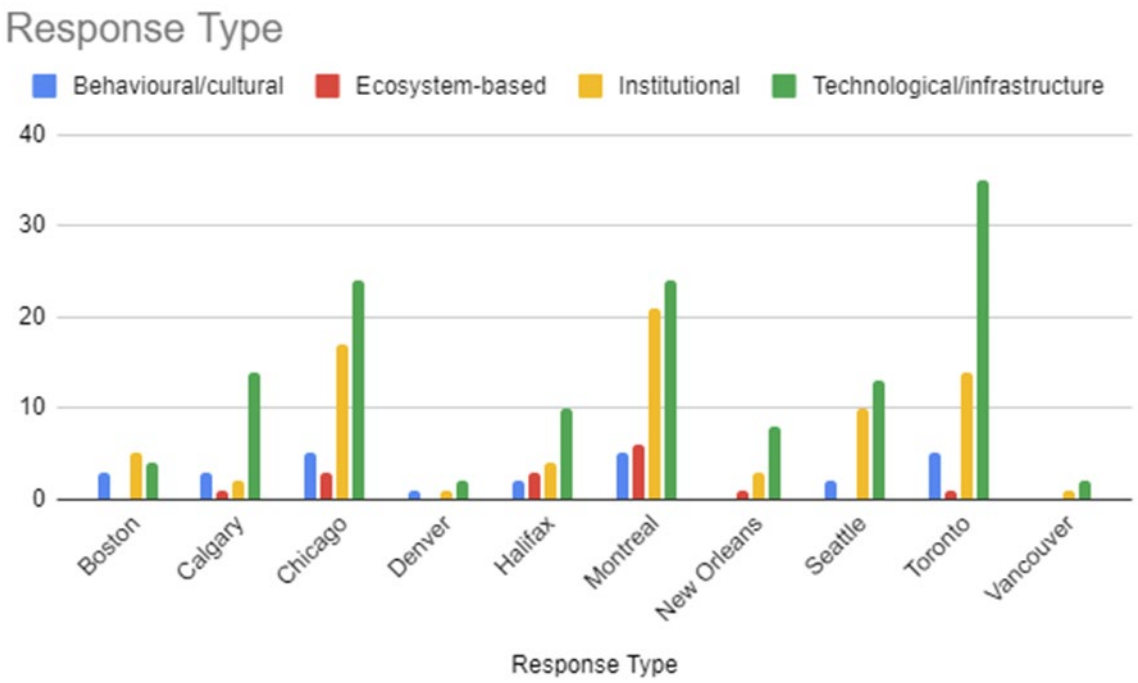


**Figure 2.** Types of climate adaptation responses for 10 major cities in the US and Canada

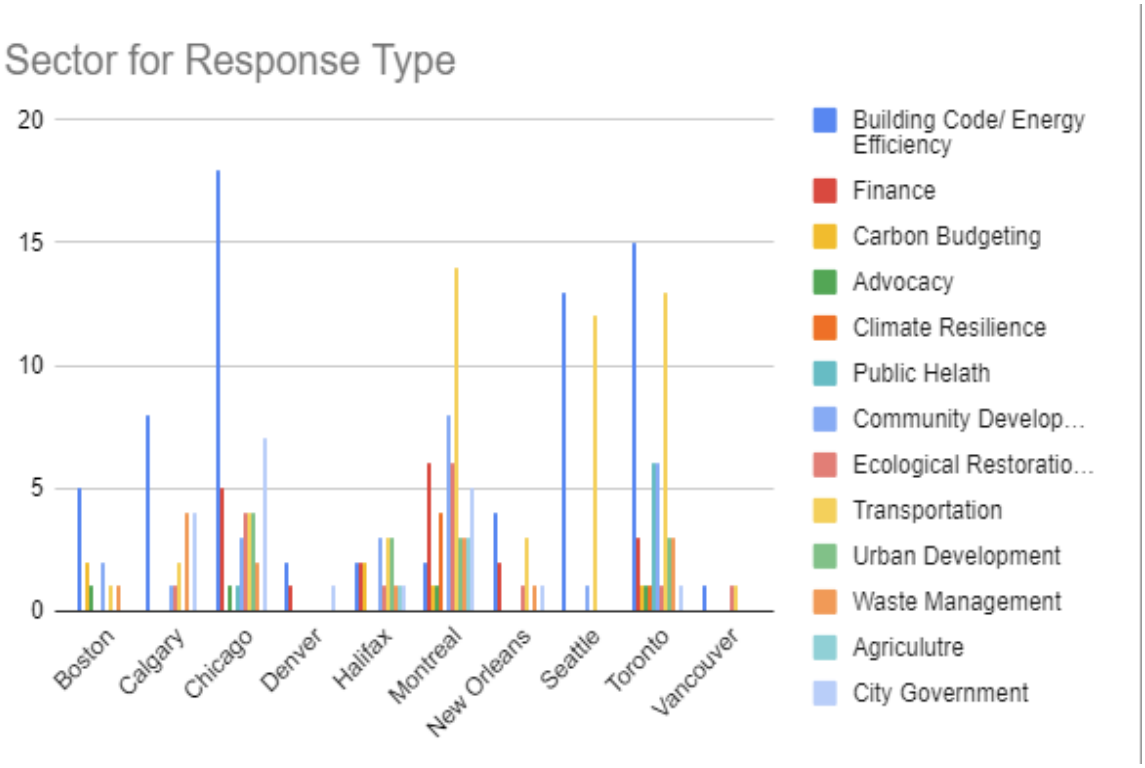


**Figure 3.** Distribution of climate adaptation response by sector

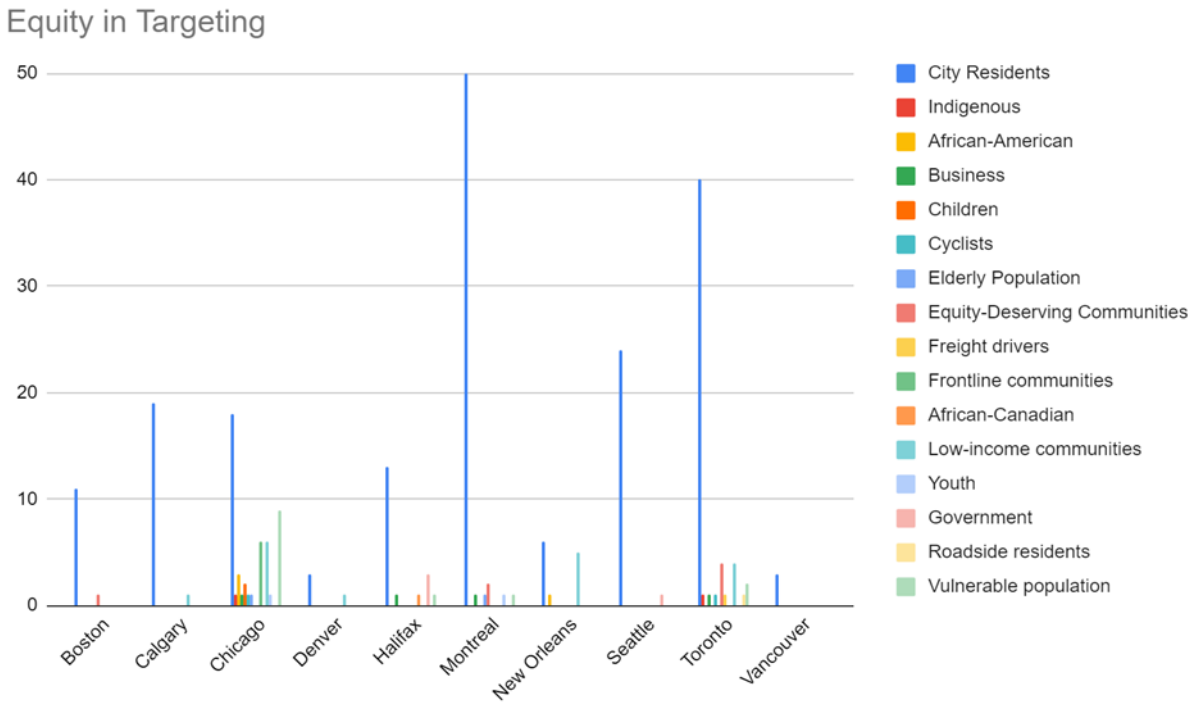


**Figure 4.** Targeted equity in climate adaptation per 10 major cities

## Discussion

Results of the analysis of climate action plans in major North American cities show that US cities specifically mention marginalized groups within their climate action plans about 36% of the time, 15% more than the Canadian cities. This disparity may be a reflection of stark differences in the role of race in shaping each country's history. The US has carried a long and complex history of slavery, segregation, and restrictions on immigration from its inception as a nation. Conversations around racial inequality are built into the country's essence. While Canada has also grappled with issues of race, especially with regard to indigenous peoples, the national conversation is often quick to turn away from such issues in favor of painting Canada as a multicultural utopia. For example, huge stories, such as the Black Lives Matter movement, have taken Canadian media much longer to pick up on (*Why Canadian Media Need to Talk More About Race | CBC Radio*, 2016).

While US and Canadian cities include climate justice considerations some of the time, there is still a considerable lack of climate justice considerations across all cities. These findings demonstrate the need for the incorporation of climate justice principles into urban design, particularly as climate change worsens. In both countries, the burden of climate change is not distributed equally, with marginalized communities carrying the majority of environmental pollution burden due to a long history of discriminatory policies. For example, Cancer Alley, located along the Mississippi River, is home to many manufacturing facilities, including chemical plants and oil refineries. This region has been severely impacted by climate change, causing serious health problems to community residents. Those who live in Cancer Alley are predominantly African American, and systemic racism and discriminatory policies have allowed these industrial facilities to be placed near their communities (Environmental Racism in Louisiana's 'Cancer Alley' Must End, Say UN Human Rights Experts, 2021). By incorporating climate justice into urban design, cities can confront both climate change and climate justice problems facing Canada and the US.

The paper's analysis shows that marginalized communities in both countries are facing more severe and dangerous climate challenges than others because the burden of climate change is not shared equally—it is forced upon these communities. Within these climate action plans, these communities are often neglected and placed on the sidelines. The majority of these plans revolve around the city population, even though all cities assessed here face climate justice issues. For instance, in New Orleans, underserved black communities are bearing the brunt of extreme weather from climate change. They lack adequate infrastructure and are extremely vulnerable to flooding and heatwaves. In the New Orleans action plan, they are only briefly mentioned. Communities located next to the coastline are facing increasing risk from rising sea levels and storm surges, yet their problems are only mentioned in a few sentences and are overshadowed by the focus on the general population. In Toronto, racialized communities, recent immigrants, and people with low incomes live in areas with soil contamination, waste sites, and industrial land use (MacDonald, 2023).

Chicago's climate action plan demonstrates higher levels of equity in targeting than Montreal. Residents of Chicago likely experience more fairness and face comparably fewer barriers in accessing the benefits of climate action. Such variation across cities within and between the two countries indicates a lack of coordination among cities and governments on policies and strategies. Montreal's lack of emphasis on addressing inequities is a reflection of an erroneous focus on using blanket strategies to alleviate the effects of climate change on the population as a whole – despite the reality that the brunt of climate change is not equal.

## Conclusion

The climate hazards facing the US and Canada are diverse and steadily intensifying. As climate change continues to impact communities, measures will have to be taken to protect citizens. Yet, not all citizens are being affected to the same degree and, as plans are developed, equity and climate justice will need to be at the forefront of municipal considerations.

At the moment, the environmental impact of climate change is manifesting in a variety of dangerous phenomena. These include heat waves, rising sea levels, air pollution, flooding, and precipitation variability. Local governments are working to contain these events in a number of ways, including ecosystem-based, institutional, and cultural approaches, but more than in any other way, they are confronting it through technology and infrastructure. In each city examined, a variety of sectors supported this response, with businesses involved in building codes, energy efficiency, and carbon budgeting being most central. Within city planning, some cities specifically mentioned "at-risk communities" in their plans, demonstrating a concern for climate justice.

Canadian and US approaches to climate justice indicate that equity in planning policy is a more central facet in US decision-making than in Canada. This likely reflects the greater population of the US, especially in cities, the disparate history of both countries, and the higher percentage of ethnic diversity and at-risk communities found in the US. It is apparent that in Canadian cities, such as Montreal, where at-risk communities are referenced in only 1.07% of the reviewed literature, there is much work to do to ensure climate change policies focus on communities likely to be disproportionately affected by such changes. Of the cities included in the research, an obvious variation in approach between cities of the same country evidences a lack of consensus in strategy. Climate change is an interconnected, global issue, and a sense of unity and agreement at the city, state, provincial, and federal level is a crucial first step towards addressing such complexity. In order for climate change to be addressed successfully, each area at each level must pull its weight.

## Limitations

- This study's analysis was limited to 10 cities in North America. This small number of cities cannot fully represent the hundreds of cities in North America. Collecting data from other cities would offer more comprehensive conclusions about climate justice and urban governance.

- Being able to conduct research in countries other than the US and Canada would also help broaden understanding on international approaches to climate justice in urban governance.

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