Towards a Climate Resilient Austin: The Health Implications of Climate Change on the Most Vulnerable Communities in Austin

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According to the recently released National Climate Assessment (NCA), climate change will disproportionately impact the health of the most vulnerable communities in Central Texas, yet exactly how climate change will impact these populations is unclear. Nationwide, there are few examples of cities looking at the impacts of climate change on existing public health issues and vulnerable communities. The 2014 release of the NCA, in addition to the 2013 completion of the Austin/Travis County Community Health Assessment (CHA) and Community Health Improvement Plan (CHIP), provides an opportunity to compare current public health issues with projected changes in climate.

As cities grapple with an increase in extreme weather events, they scramble to identify a process to make their operations and assets more resilient to climate change. "Despite the surge in interest and the plethora of new resources available for local governments, there is a paucity of comprehensive and binding adaptation plans for communities." In recent years, several nonprofits and federal agencies have tested methods to assess sector-based climate vulnerability. Government and nongovernmental organizations such as Local Governments for Sustainability (ICLEI), Center for Disease Control (CDC), and the Federal Highway Administration (FHWA) have created tools to help cities and metropolitan regions understand and implement climate resilient strategies. Yet these frameworks are untested and currently do not provide a method to incorporate climate change impacts in the public health planning process.

The key challenge with the frameworks is the act of identifying the climate change projections before identifying the climate thresholds. This impacts-oriented approach creates confusion and uncertainty when applied to specific real-life situations. "The cascading uncertainties associated with this approach (especially those associated with downsampling global climate model information to short time and small spatial scales) render the approach of limited value to on-the-ground adaptation." To counter the uncertainty of the impacts-oriented approach, starting with a vulnerability assessment before introducing climate projections allows the user to focus on specific impacts of climate change rather than any potential issues.

In this paper, I take a deductive approach that starts with a review of the CHA and CHIP to identify issues that are directly impacted by hotter and
longer heat waves including a lack of physical activity, a decrease in mobility, and greater social isolation. These issues are then compared to likely climate scenarios for Austin in the coming century. For Austin, climate scientists project longer and hotter heat waves and higher overnight average temperatures. The result is an overview of health implications for vulnerable communities in Austin from an increase in heat. The NCA, Austin/Travis County Community Health Assessment (CHA) and Community Health Improvement Plan (CHIP) broadly identify vulnerable communities as children, the elderly, the sick, the poor, and some communities of color.

The National Climate Assessment (NCA) is a stakeholder-driven process that provides climate projections and potential impacts for different regions in the United States. The assessment is periodically updated and the most recent report is now available to the public. The authors of the report are experts on specific topics who together compile a draft that is made available for public comment prior to the final release. The assessment makes the case that the climate is changing and that human activity is one of the main drivers for this change. It also goes into detail on the impacts climate change will have on vulnerable communities, transportation, and health.

Comparing the NCA and CHA/CHIP reveals that an increase in intensity and duration of heat waves will make it especially dangerous for vulnerable communities who already struggle with health issues sensitive to heat such as obesity, respiratory ailments, and social isolation. The following is a look at the impacts of climate change on these particular issues.

Obesity

According to the CHA, many low-income areas struggle with obesity, and the differences in obesity rates between minorities (Latinos and African American) and majority (white) are significant. The likelihood that an African American is obese is over twice that of a white individual in Travis County. Less than 20 percent (19.4 percent) of whites in Travis County are considered obese while over one-third (36.5 percent) of Latinos and over 40 percent (41.7 percent) of African Americans are considered obese. Although there are many social, political, and economic factors that might account for these differences, the CHIP focuses its strategies to improving physical activity and access to nutritious foods.

The CHA identifies Chronic Disease (focus on obesity) as the first of four priority areas. As a recommendation, the CHIP suggests that adults engage in aerobic physical activity for at least 150 minutes per week. For children this number is higher, with a suggested minimum of 60 minutes per day for at least 5 days per week. Recently there have been efforts to create an educational campaign around physical health and increasing access to outdoor activity areas through joint-use agreements. These agreements would allow community members and organizations to jointly use private outdoor spaces. The goal is to have a 5 percent increase in time spent exercising for adults and children.

With a projected increase in heat, the goal to increase outdoor physical activities may, at times, prove dangerous for participants. According to the NCA, regional temperatures are expected to rise by 5 degrees by mid-century and 10 degrees by the

CHA, CHIP and NCA

The City of Austin and Travis County Health & Human Services Department (ATCHHSD) recently banded with local health and transportation agencies to identify community health issues in the Community Health Assessment (CHA) and suggested strategies to mitigate priority-identified impacts in the Community Health Improvement Plan (CHIP). The plan was created in two phases, the first of which was called the Community Health Assessment (CHA). This yearlong effort identified several key issues affecting health ranging from obesity to lack of adequate transportation options. The second phase was called the Community Health Improvement Plan (CHIP), which prioritizes four health issues, identifies goals, and sets a path forward for improving the Public's health issues in the Austin/Travis County community. The four priority issues are Chronic Disease (focus on obesity), Built Environment (focus on access to healthy foods), Built Environment (focus on transportation), and Access to Primary Care and Mental/Behavioral Health Services. The spatial boundary of the assessment area is based on the Travis County lines.

The CHA, CHIP and NCA

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With a projected increase in heat, the goal to increase outdoor physical activities may, at times, prove dangerous for participants. According to the NCA, regional temperatures are expected to rise by 5 degrees by mid-century and 10 degrees by the
end of the century. These numbers do not simply mean a daily increase in the given temperature but an increase in variability in temperature (both hot and cold) and precipitation (both intense rain storm and droughts). For Austin, specifically, climate projections indicate that summer daytime temperatures will likely surpass the 100°F and 105°F mark by mid-century.1

According to the CDC, using outdoor physical activity to decrease obesity during a heat wave is not recommended. Individuals who are at greater risk of heat stress include “those who are 65 years of age or older, are overweight, have heart disease or high blood pressure, or take medications that may be affected by extreme heat.”2 In other words, the CHIP recommendation to increase physical activity through active transportation to help those who are obese focuses on the same segment of the population most at risk of heat stress, namely those who are obese. “Death from extreme heat is the number one weather-related killer in North America and likely the world.”3 This does not decrease the need for those who struggle with obesity to lose weight or engage in active transportation, but it highlights the importance of understanding the dangers of extreme heat and that high temperatures will increase in the near future.4

Ground Level Ozone

Encouraging vulnerable communities to participate in vigorous physical outdoor activities might also conflict with dangerously poor air quality. One particularly dangerous airborne chemical is ground-level ozone. According to the former Environmental Protection Agency (EPA) administrator Lisa Jackson, ground-level ozone is “one of the most persistent and widespread pollutants we face.”5 Ground-level ozone can cause premature death from heart or lung disease for those who experience prolonged exposure. The NSA projects that ozone levels will increase solely due to climate change.6 “Cities’ ozone levels are estimated to increase under predicted future climatic conditions, with the largest increases in cities with present-day high pollution.”7

Ground-level ozone is created when air pollutants such as volatile organic compounds (VOCs), methane (CH4), nitrogen oxides (NOX), and carbon monoxide (CO) are combined and exposed to sunlight. Sources of these chemicals range from large industrial facilities to chemical solvents but the most common source is motor vehicle exhaust gasoline vapors. Although most prevalent from April to October, ozone can also occur during winter months.

Given that the most common source of VOCs and NOx are motor vehicle exhaust and gasoline vapors, it is assumed that the highest amounts of ground-level ozone occur near major roadways and gas stations. Our growing population reflects a general increase in vehicles on roads throughout the day. This puts some existing schools and community centers in a strange predicament: Schools that were once located on small neighborhood roads with little traffic now find themselves adjacent to heavily traveled roads that emit more air pollution than ever before. This population growth also comes with new construction. The locating of new activity centers and schools near major roadways puts children and adults in increasing danger of air borne diseases. Climate change projections in Texas also include longer and hotter droughts.8 With these prolonged periods, more sunshine will create the conditions that allow for increased amounts of ozone. According to the NCA, there is a “very high confidence” that climate change will decrease air quality overall.9 The climate assessment states that climate change will increase concentrations of ground level ozone an additional 1 to 10 parts per billion.10 This will make it harder for regions to abide by EPA regulations and will certainly push those areas that are typically in air quality compliance into nonattainment. The connection of ground level ozone to climate change is even more specific. The NCA goes on to state that for every 1.80F increase in temperature, an additional 1,000 premature deaths will happen every year. By 2050 we will see an additional 4,300 premature deaths per year connected to climate change and air quality.11

The process of locating activity centers away from emission sources highlights the need to incorporate public health planning and climate change projections into large community and regional planning efforts. As the City of Austin works through the details of implementing the 2012 Imagine Austin Plan, it is reassuring that regional public health agencies (City of Austin and Travis County Health & Human Services Department, Veteran’s Services, Central Health, St. David’s Foundation, Seton Healthcare Family, the University of Texas Health Science Center at Houston, School of Public Health Austin Regional
Campus, and Austin/Travis County Integral Care) are engaged in the process. These organizations work collaboratively to assess current public health issues and provide input on the planning process. One key planning consideration, identified by the CHA, is transportation and access to health services for vulnerable populations.

Mobility

According to the CHA, living in a community that was not “walkable,” i.e., one that lacks public transit within the approximate vicinity, was identified as the main factor that hindered residents’ access to health services. The communities most likely to feel this effect are suburban style neighborhoods that are segregated from amenities by large freeways and rural neighborhoods whose low density necessitates some kind of motorized vehicle to accomplish basic tasks. These suburban and rural landscapes are especially difficult for seniors and children who are not able to drive.

Low-income seniors on fixed incomes who are not able to afford an apartment in the downtown area may need to distance themselves from family and friends in order to find an affordable place to live. This gives vulnerable communities few choices for mobility, as the majority of new suburban neighborhoods do not include pedestrian friendly streets, shaded bus stops, or crossing signs on busy streets.

The goals identified in the CHIP to increase access to healthcare facilities and encourage active transportation are potentially hindered by an increase in overall temperature. Active transportation is the process of walking, riding a bike, or taking public transportation to your proposed destination, i.e., transportation that includes physical activity. Both goals create a situation where low-income individuals will spend time walking along streets or waiting at an unsheltered bus stop. This exposes individuals to dangerously high temperatures and higher levels of ground-level ozone. Those who take the bus will sometimes wait a long time for a bus to arrive only to then transfer multiple times before reaching their final destination. In addition, bus stops without shade make waiting for a bus in the summer heat especially dangerous.

The built environment plays an active role in both heat intensification and mitigation. Added to the climate change-driven increases in temperature are the effects of the urban ‘built’ environment… cities and their climates are co-evolving in a manner that will amplify the effect of heat as well as the vulnerability of urban populations to heat-related deaths.” Roads and buildings absorb and retain the sun’s heat during the day, increasing daytime and nighttime temperatures. Temperatures in urban areas sometimes increase to 9°–11°F hotter than surrounding rural areas, an occurrence known as the Heat Island Effect. When considering that the temperature might rise to 110°F, the Heat Island Effect could raise temperatures closer to 120°F, not including humidity or heat index. Typically, bus stops are located on the sidewalk adjacent to a given road. These materials retain heat during the day making the act of standing outside in an unprotected space particularly dangerous. In addition, wind can exacerbate the health impacts of the urban heat island effect.

While wind was previously identified to ameliorate regional ozone levels, wind created by the heat island effect can instead negatively impact air quality. “Mesoscale wind produced by the urban heat island helps the pollutants to circulate and move in upward direction, thus making the problem of air pollution more severe in urban areas.” All of these factors can make waiting for a bus on a hot summer day a potentially dangerous activity.

Isolation

Those who have minimal contact with the outside community are especially vulnerable to heat-related illness and death. All persons are at risk for hyperthermia when exposed to a sustained period of excessive heat; however, factors that increase the risk for hyperthermia and heat-related death include age (e.g., the elderly), chronic health conditions (e.g., cardiovascular disease or respiratory diseases), mental illness (e.g., schizophrenia), social circumstances (e.g., living alone), and other conditions that might interfere with the ability to care for oneself. This is alarming when considering that this segment of the population is increasing. “The number of people living alone is rising almost everywhere in the world, making it one of the major demographic trends of the contemporary era.” Mental health plays a large role in isolation as well as those with certain physical ailments. “Patients with severe mental illness such as schizophrenia are at risk during hot weather because their medications may interfere with temperature regulation or even directly cause hyperthermia.” Whether a community member does or does not have a mental illness, social isolation is especially dangerous during a heat wave.

In addition to those with mental illness, the elderly, children and minority groups are also at risk from increasing temperatures. “Mental health” can either include actual mental illness or addiction but often times both issues are intricately intertwined. In the CHA, stakeholders identify depression and stress as a motivator for people to abuse drugs and alcohol. Those who suffer from mental illness
are especially isolated due to the many barriers that prevent them from getting help. “These barriers reflect issues for the individual in terms of the direct impact of the illness on function, for the broader community, in terms of the impact of expectations and attitudes on service provision and employment outcomes, and for policy settings, impact on access to/availability of services. In addition to these barriers, the individuals must overcome the stigma attached to mental health and addiction, complexity of health care regulations, funding cuts to services, limited hours of health service operations, and lack of knowledge of existing services.”

The NCA also references the impacts of heat and isolation. With temperatures expected to rise, members of the most vulnerable community will undoubtedly get hurt. This will be the case if, during a heat wave, a community member decides to stay indoors. “The body’s defense can only take about forty-eight hours of uninterrupted exposure to such heat before they break down?” If temperatures are expected to rise during both the daytime and nighttime, the body will not have the ability to appropriately cool down. According to climate projections, Austin will see high temperatures of 1100°F much more often. What is especially worrisome is that nighttime temperatures will also remain high. Climate projections estimate fewer nights when temperatures will get below 800°F. Having high nighttime temperatures will mean that buildings and people without air-conditioning cannot cool down. Those in isolation are more likely to not ask for help, putting themselves in further danger of heat-related illness or death. Members of the most vulnerable community may not be able to seek help, putting themselves in further danger of heat-related illness or death.

Conclusion

The goal of public health agencies is to promote and protect a healthy community through the use of best practices and community partnerships. Understanding the impacts of climate change is the first step towards ensuring that Austin residents are safe from harm. If public health agencies take a course of inaction there could be dire consequences. As fewer people doubt that the climate itself is changing, it is time for us to start considering alternative actions that will protect the health and wellbeing of all present and future community members.

References:

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2. Pim Martens, Health and Climate Change: Modeling the impacts of global warming and ozone depletion (Hoboken: Taylor and Francis, 2014)


