In 2021, Hamilton county had a population of 826,139 people.[1] Based on Hamilton county census data, there are an estimated 54,000 individuals with an ambulatory disability, which is the most common type of disability in Ohio. CDC data projects that this number is even higher, at over 90,000 individuals, which is more than enough people to fill the Paycor Stadium in Cincinnati to capacity.[2,3] Furthermore, census data from 2022 indicates that Hamilton county alone has an elderly population (65+) of more than 140,000 individuals (16.8%).[4] Hamilton County Public Health (HCPH) aims to empower the residents of Cincinnati and promote healthier lives within the community, particularly for those with accessibility needs. In the event of a natural disaster that displaces residents of Hamilton County, HCPH is expected to protect all residents, particularly those with increased needs.[5] Some of these unique needs will include special considerations for communication, transportation, and accessibility.

Rising carbon emissions are well documented to exacerbate climate change, with cars being one of the leading contributors. However, Cincinnati's existing infrastructure is inadequate for non-car travel and access also varies greatly based on location within the city. According to WalkScore, Cincinnati scores below average on walkability and transit, and significantly below average in terms of bikeability. In addition, many technically "walkable" areas downtown can be dangerous to walk in, and transit reliability can be poor.[6,7] Clearly, having a car is nearly essential in this city. This has widespread effects, including negatively impacting residents' economic mobility in addition to being a further driver of climate change. Studies have shown folks with lower socioeconomic status are more likely to be negatively affected by natural disasters, and this can also negatively impact people with mobility issues and disabilities, as they may find it difficult to find transportation.[8]

Climate change is expected to impact the city of Cincinnati's infrastructure and population. Current reports from the National Centers for Environmental Information predict that the 40% increase in rainfall in the city of Cincinnati could cause the Ohio River to surge 25% in the next 30 years.[9] This has a huge impact on public infrastructure and disaster response preparedness. For example in 2017 storm-related issues caused the city to spend $50 million.[10] Preparedness and prevention measures in urban planning, climate change initiatives, and disaster preparedness measures will help to mitigate costs and fortify the local population against future inevitable disasters.

The National Centers for Environmental Information also projects that the annual temperature of the city will rise by seven degrees, and there will be on average two major heat waves a year.[9] Heat waves are particularly dangerous for at-risk populations such as the elderly or health compromised that live in urban areas. A 2022 study done in Hamilton County reported

29,270 heat-related emergency medical incidents during the warm seasons from 2016 to 2020.[11] They found that neighborhood environmental features had an impact on the number of reports from specific areas. Statistically significant features included the percentage of grass area, the percentage of the population over 65, and the percentage below the poverty line.[11] Indicating that both social determinants of health, as well as urban planning, have an impact on disaster susceptibility. Better urban planning taking into account environmental factors and the changing climate will impact public health in Hamilton County for the better.
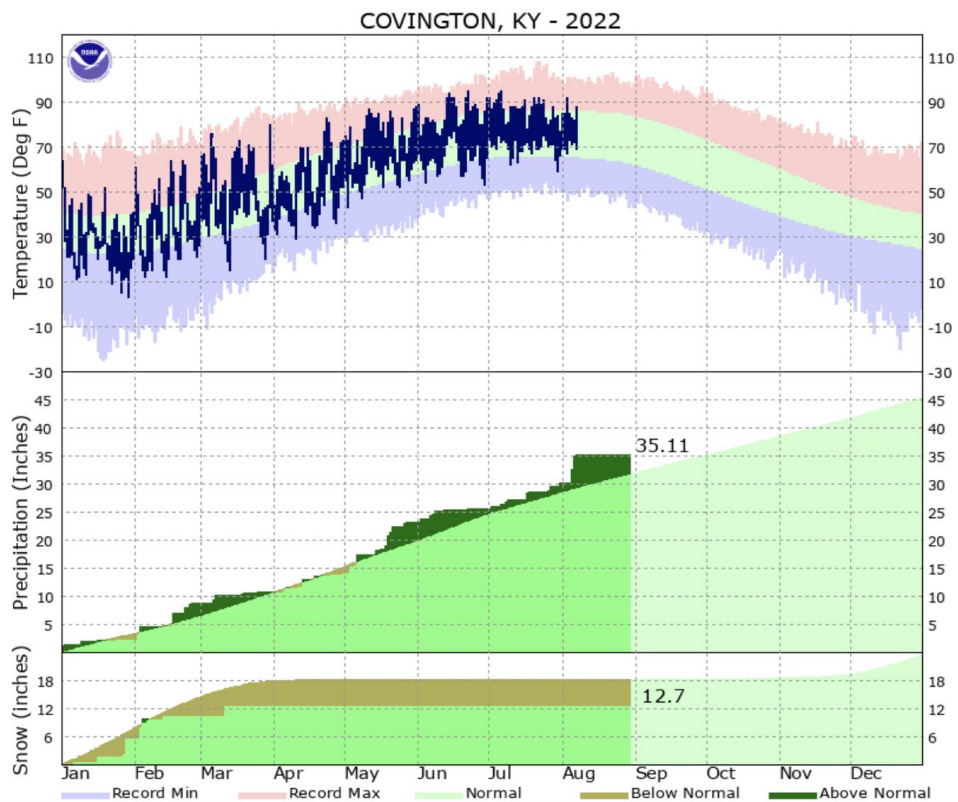
The City of Cincinnati created a plan to address climate change, called Green Cincinnati. One of the main components of this plan includes initiatives to decrease emissions from transportation. Cincinnati is looking to shift its transportation to be more people-focused, sustainable, and accessible. The city plans to invest more funding, resources, and planning to make the transportation system better for the community and the environment, which will also contribute to decreasing the likelihood of natural disasters. In addition to combating climate change, improving public transport by way of public transportation, bike lanes, and better sidewalks offers the opportunity to mitigate inequalities across Cincinnati by improving access to healthcare, resources that influence health, and a lifestyle that promotes better health outcomes.[12]

Regarding improving Hamilton County's overall infrastructure, there are many different federal and state grants available. After the Bipartisan Infrastructure Law was passed in December 2021, FEMA expanded the Resources for Climate Resilience Program. This program aims to reduce the vulnerability of communities to environmental disasters.[13] As these disasters have been increasing in frequency due to the effects of climate change, it is critical to help proactively protect our communities from their devastating consequences.[11] FEMA offers different "programmatic tools, grants, and other initiatives [to] support stakeholders in assessing risk, planning to mitigate risk, funding mitigation projects and/or building community capacity."[13] Notably, any SLTT governments and other eligible non-profits can apply for these grants.[13]

Not only do these grants and programs help to proactively reduce communities' vulnerabilities to disasters, but FEMA also offers a post-disaster Hazard Mitigation Grant Program.[14] This program aims to help communities "rebuild in a way that reduces or mitigates future disaster losses. Grant funding is available to increase a community's preparedness in advance of climate-related extreme weather events, improving their ability to recover."[14] In addition, FEMA also offers a Building Resilient Infrastructure and Communities (BRIC) Grant Program.[14] This program also "aims to categorically shift the federal focus away from reactive disaster spending and toward research-supported, proactive investment in community

resilience."[14] Finally, in March 2023, President Biden initiated the Inflation Reduction Act, which "authorizes FEMA to fund costs associated with low-carbon materials to help cut carbon pollution and support climate resilience and communities."[15]

To help mitigate the devastating effects of climate change on disasters and emergencies, we need to ensure that our community is as prepared as possible to help all citizens. One aspect of this is ensuring that our infrastructure is up-to-date and accessible. By creating a more eco-friendly and user-friendly transportation system, the city will do its part in combating climate change, while also ensuring that its citizens are able to utilize the emergency relief supplies and shelters provided by Hamilton County Health Department and its community partners. Finally, disasters often wreak havoc on buildings and homes. This affects all citizens, but especially those with mobility and accessibility needs. By advocating for funds from the local, state, and federal government, Hamilton County can not only help rebuild after disasters, but also proactively protect our community by constructing environmentally conscious and more structurally sound infrastructure. Overall, climate change is affecting all communities, including Hamilton County, and it is critical to protect all citizens and the environment.

Students and physicians can play a vital role in advocating on behalf of the community to the Cincinnati government. There are a number of avenues in which students can get involved in advocacy, including through AMA membership and advocacy conferences such as the AMA MAS.[16] Students can additionally meet with curriculum leaders to encourage continued discussion of pertinent issues or directly advocate to the city government to increase awareness and emphasize the need for public funding. Physicians can likewise play a crucial role in instilling change within their community by using engagement with patients from the community to further inform and improve future patient engagements. Additionally, physicians can directly advocate to the government on behalf of their patients. Through a concerted effort, physicians and medical students can support the Cincinnati community by highlighting major issues that need to be addressed and corrected.

Our community partner's work can be supported and expanded by providing continuing education and partner collaboration with other public health departments serving similar demographics. Interdisciplinary collaboration across healthcare providers, public service workers, and transportation workers can ensure cohesive and uniform responses. Continuing to increase the investment in technology infrastructure and data analysis can allow for the public health department to better anticipate needs and coordinate responses more efficiently. It would be advantageous to include outside resource management professionals who can help best allocate and effectively utilize the funding given to the public health department.

The city of Cincinnati can coordinate with Hamilton County to ensure that the people with mobility issues have access to public services (doctor appointments, grocery stores, etc.) with appropriately outfitted vehicles or adequate public transportation. Citizens would benefit from outreach from the public health department after acute changes in their mobility status. A registry of mobility-restricted individuals could be formed to ensure that citizens are not left without resource access. A community support network may be bolstered by the public health department, helping connect mobility-impaired individuals across the city. A strong organization may increase individual resilience, improve mental health of those afflicted, and help connect the otherwise isolated. A robust community network may also assist with the sharing of resources such as unused motorized wheelchairs, walkers, etc. across the mobility-impaired community.

Although public transportation already accommodates for handicapped individuals, these routes may still be inaccessible for those who have advanced mobility challenges. The public health department could consider providing funding for rideshare apps such as Uber and Lyft which provide specially-equipped vehicles for those in neighborhoods not well serviced by

current public transportation infrastructure. In addition to commuter assistance, the public health department could also serve as a government advocate to improve sidewalks, ramps, and handrails, which would reduce risk of injury for those with mobility disadvantages.

References

1. Census profile: Hamilton County, OH. Census Reporter.
https://censusreporter.org/profiles/05000US39061-hamilton-county-oh/

2. CDC. Disability & Health U.S. State Profile Data: Ohio | CDC. Centers for Disease Control and Prevention. Published September 12, 2019.
https://www.cdc.gov/ncbddd/disabilityandhealth/impacts/ohio.html

3. CDC. Template Package 4. Centers for Disease Control and Prevention. Published March 28, 2018. Accessed March 15, 2022.
https://dhds.cdc.gov/SP?LocationId=39&CategoryId=DISEST&ShowFootnotes=true&showMode=&IndicatorIds=STATTYPE

4. U.S. Census Bureau QuickFacts: Hamilton County, Ohio. www.census.gov. Accessed August 25, 2023.
https://www.census.gov/quickfacts/fact/table/hamiltoncountyohio/AGE775222#AGE775222

5. Serving the Residents of Hamilton County, Ohio. Hamilton County Public Health. August 23, 2023. https://www.hamiltoncountyhealth.org/.

6.Reported Crime. insights.cincinnati-oh.gov. https://insights.cincinnati-oh.gov/stories/s/Reported-Crime/8eaa-xrvz/

7.Most Walkable Cities in the United States, Canada, and Australia on Walk Score. Walk Score. Published 2020. https://www.walkscore.com/cities-and-neighborhoods/

8.SAMHSA. *SAMHSA Disaster Technical Assistance Center Supplemental Research Bulletin Greater Impact: How Disasters Affect People of Low Socioeconomic Status*.; 2017.
https://www.samhsa.gov/sites/default/files/dtac/srb-low-ses_2.pdf

9. Annual 2016 Global Climate Report | National Centers for Environmental Information (NCEI). Accessed August 25, 2023. https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/201613

10. Local Impacts of Climate Change. Accessed August 25, 2023. https://www.cincinnati-oh.gov/oes/climate/local-impacts-of-climate-change/

11. Lee K, Brown RD. Effects of Urban Landscape and Sociodemographic Characteristics on Heat-Related Health Using Emergency Medical Service Incidents. *Int J Environ Res Public Health*. 2022;19(3):1287. doi:10.3390/ijerph19031287

12. Green Cincinnati Plan. www.cincinnati-oh.gov. Accessed August 25, 2023. http://www.cincinnati-oh.gov/oes/climate/climate-protection-green-cincinnati-plan/

13. *FEMA Resources for Climate Resilience*.; 2021. https://www.fema.gov/sites/default/files/documents/fema_resources-climate-resilience.pdf

14. About BRIC: Reducing Risk through Hazard Mitigation | FEMA.gov. www.fema.gov. https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities/about

15. FEMA. Building a Clean, Climate-Resilient Economy through FEMA's Grant Programs. https://www.fema.gov/grants/policy-guidance/low-carbon-goals#:~:text=The%20Inflation%20Reduction%20Act%20authorizes,back%20cleaner%20and%20more%20resilient.

16. Medical Student Advocacy. American Medical Association. Published August 14, 2023. Accessed August 25, 2023. https://www.ama-assn.org/medical-students/medical-student-advocacy