Connecting to Community: Assessing Community Engagement and Participatory Decision-Making in Resilience Hub Development

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Abstract

This thesis explores how resilience hubs fit into other municipal climate resilience and adaptation planning efforts and how community engagement and input influences resilience hub development. Structured around case studies of resilience hubs in Medford and Cambridge, MA, this research employed semi-structured interviews with key informants and content analysis of municipal documents to fill gaps in the limited academic literature about resilience hubs. Findings from the research indicate that while resilience hubs build upon data from resilience and adaptation planning documents about climate impacts and vulnerable populations, they are mainly informed by direct input from residents and community-based organizations and use more participatory and collaborative methods of community engagement that those traditionally used in adaptation planning. The process of developing resilience hubs in each municipality has fostered stronger bridging and linking social capital through engagement methods that shift some decision-making and agency to residents and community-based organizations.

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Key Terms and Acronyms

Terms

Adaptive Capacity	The ability of organizations, resource and systems to be flexible and respond to changing scenarios and needs, like in the face of climate disruptions.
Climate Disruptions	The range of climate change impacts, like extreme heat, extreme storms, flooding and sea level rise, that can disrupt daily life and have negative health consequences for communities
Community Resilience	The collective ability of a neighborhood or geographically defined area to deal with stressors and efficiently resume the rhythms of daily life through cooperation following shocks
Environmental Justice Communities	Communities who experience more severe climate impacts because of structural inequities. As defined by the Commonwealth of Massachusetts, these are lower-income communities with high proportions of minority residents and limited English proficiency.
Resilience Hub	Community facilities designed to meet a community's needs before, during and after an emergency or climate disruption.
Social Capital	The relationships, connections and networks that people have with individuals, groups, organizations and power structures that impact their own resilience.

Acronyms

ACR	Accelerating Climate Resilience grant program, funded by the Metropolitan Area Planning Council
CAAP	Medford's Climate Action and Adaptation Plan
CBO	Community Based Organization
CCC	Cambridge Community Center
CE2O	Community Engagement to Ownership framework, developed by Facilitating Power
CCVA	Climate Change Vulnerability Assessment
HMP	Hazard Mitigation Plan
MAPC	Metropolitan Area Planning Council, the regional planning agency for Greater Boston
MVP	Municipal Vulnerability Preparedness program, an initiative of the Massachusetts Executive Office of Energy and Environmental Affairs that supports municipalities in planning for climate resilience
USDN	The Urban Sustainability Directors Network, a national organization that advances sustainability and resilience among member municipalities.

Chapter 1: Introduction

Although many municipalities and states are working towards reducing their greenhouse gas emissions and other climate mitigation goals, it is well understood that adapting to existing climate impacts and preparing for future impacts is of equal importance. According to the IPCC's most recent report, human-caused global warming has already led to extreme weather such as heavy precipitation, droughts, and heatwaves and has negatively impacted human health, livelihoods and key infrastructure in urban areas (Cisse et al. 2022). Within Massachusetts, the greatest climate-related risks include higher temperatures and heat waves, less rainfall and more extreme rain events, sea level rise, and more intense coastal storms ("Massachusetts Climate Change Assessment" 2022). As communities feel these impacts more often, there is a growing need for systems of adaptation and resilience. Resilience to climate disruptions can be defined in many ways, but for the purposes of this thesis, resilience will be defined as the ability of individuals, groups and socio-ecological systems to adapt to and transform in the face of climate disruptions in addition to cultivating the capacity to 'bounce forward' into new states (Murray and Poland 2020). Planning for resilience to climate disruptions is gaining popularity amongst federal, state, and local governments as they grapple with increasingly severe climate impacts.

This rise in resilience planning is paralleled by a growing recognition that systemic social factors such as race and ethnicity, income level, housing stability, food security, and social capital, amongst others, can greatly influence individuals' and communities' ability to weather and recover from climate disruptions (Cisse et al. 2022). Furthermore, myriad unjust historical urban policies have created conditions where low income people and people of color, amongst other marginalized groups, experience the brunt of negative climate impacts (Baja 2022). Addressing environmental justice issues related to race and ethnicity is increasingly at the forefront of climate work, with programs ranging from the Biden administration's Justice40 initiative to

Massachusetts' Environmental Justice Strategy directing attention and funding towards BIPOC communities that experience the brunt of negative climate impacts (Executive Office of Energy and Environmental Affairs 2024; "Justice40 Initiative | Environmental Justice," n.d.). Consequently, many municipalities are searching for climate interventions that will bolster their community's resilience on a day-to-day basis by addressing chronic stressors while also providing necessary emergency services during acute climate disruptions.

One such adaptation solution gaining traction amongst local governments are resilience hubs, which are community facilities designed to meet a community's needs before, during and after an emergency or climate disruption. As defined by the Urban Sustainability Directors Network (USDN), a leading organization in the development of resilience hubs, these facilities are physical spaces that strengthen communities before, during and after disasters "while also improving year-round conditions and providing community benefit" (Baja 2019, p. 6). Typically, resilience hubs function primarily as community centers that offer gathering spaces, education programs, connections to social services and myriad other programs that aim to improve social resilience and build community.

What distinguishes many resilience hubs from traditional community centers is their capacity to also meet resident needs during emergency situations like extreme heat or cold, natural disasters, flooding events and extended power outages (figure 1). This thesis will use the term 'climate disruptions' to collectively refer to the range of extreme weather, natural disasters, and other emergency scenarios that resilience hubs are planned around. In some models, resilience hubs are outfitted with a renewable energy source, like solar panels, and battery storage so that they can provide heating and cooling, refrigeration, and other electricity-dependent resources

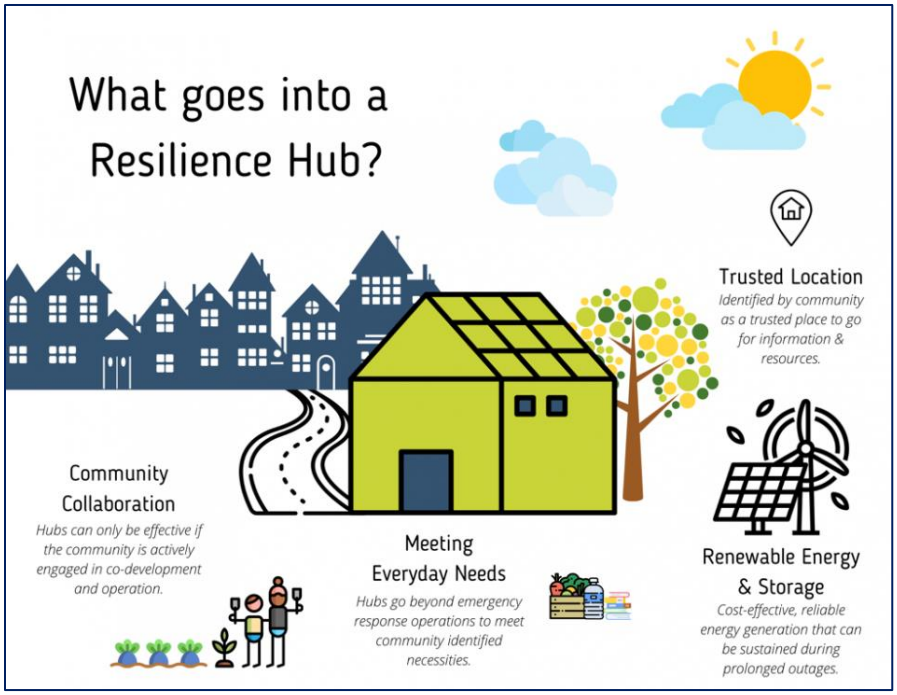

Figure 1: Graphic depicting the elements of a resilience hub (Graphic by Kirwan et. al. in "Framework for Implementing Resilience Hubs in Ypsilanti, Michigan" [2021]: 13. Graphic courtesy of University of Michigan School for Environment and Sustainability)

when the power is out. They may also have resources like food, water and medical supplies that are critical in times of disruption. Resilience hubs are often included in a network of organizations that help connect community members to the resources they need to recover from climate disruptions.

Because of structural inequities that have made people of color, low income and other marginalized groups unequally exposed and sensitive to the effects of climate change, resilience hubs are often encouraged to be located in communities with high concentrations of these priority populations (Baja 2019). The idea is that resilience hubs will be most impactful when serving communities that may otherwise lack the resources, social capital and adaptive capacity to weather and recover from climate disruptions (Baja 2019). Social capital describes the relationships and networks people have that connect them to community and facilitate access to resources, while adaptive capacity is the ability of systems and networks to respond quickly to changing conditions (Aldrich and Meyer 2015; Norris et al. 2008). Resilience hubs can also serve to create better connections between government and community-based organizations (CBOs), who have been shown to play a pivotal role in disaster resilience because of their on-the-ground connections within communities (Murray and Poland 2020).

Resilience hubs exist within a larger network of climate adaptation and hazard mitigation planning efforts at federal, state, and local levels. These efforts have traditionally taken a top-down approach, led by agencies like the Federal Emergency Management Agency (FEMA) or the Massachusetts Emergency Management Agency. Traditional hazard mitigation strategies, and to some resilience plans, are often critiqued for focusing mostly on the resilience of infrastructure and physical systems, with little to no consideration for socio-economic factors that affect community resilience (Aldrich and Meyer 2015). Academic scholarship has long recognized the importance of place-based resilience solutions that incorporate input from community members and address locally identified needs, characteristics that, historically, have not been included in top-down adaptation planning. Although community resilience is still less well addressed than other types of resilience, there is a growing understanding of the importance that community resilience plays in successful adaptation to climate disruptions. Increasingly, municipalities are including language and goals about community resilience in their adaptation and resilience planning and seeking direct strategies to improve it, like resilience hubs, for example.

Resilience hubs, in theory, are an effective place-based solution to improve preparedness for climate disruptions and to boost community resilience day to day. Guidance for developing resilience hubs includes practices for involving local community members in identifying local climate-related needs, suggesting services to be provided, and developing programming. Successful resilience hubs are trusted community spaces that residents are comfortable using every day and when faced with climate disruptions.

However, because resilience hubs are a new concept, there is little information, academic or otherwise, about *how* municipalities are developing resilience hubs and to what extent community feedback is influencing their development. As resilience hubs become more common and better resourced, it is critical to understand what gaps they are filling within the

ecosystem of existing climate resilience plans, how the needs that resilience hubs purportedly serve are identified, and how community engagement is incorporated into the planning process. This thesis will explore these topics through case studies of resilience hubs being developed in Cambridge and Medford Massachusetts, with the goal of expanding literature on resilience hub development and providing recommendations for municipalities and other practitioners exploring resilience hubs as a community resilience intervention for their own communities.

Research Questions

To address the gaps in information about how resilience hubs fit into existing adaptation and resilience measures and how municipalities are developing hubs, this thesis will address the following research questions:

1. How do resilience hubs address community resilience related gaps in climate mitigation and adaptation planning efforts in Medford and Cambridge?
2. How were community resilience needs identified in resilience hub planning processes in Medford and Cambridge (e.g., metrics, engagement, gap analysis)?
3. What aspects of resilience hub development did feedback from community engagement activities influence in Medford and Cambridge?

Background

Resilience Planning and Funding in Massachusetts

As the effects of climate change impact more people, there is a growing emphasis in urban planning and city governance on adapting and transforming society to weather those effects equitably. Massachusetts is no exception to this trend, with myriad resilience-related plans and grant programs rolled out in recent years. The state's most recent hazard mitigation and climate adaptation plan was titled *ResilientMass*, and its release was joined by publication of other resources like the ResilientMass Climate Hub and the ResilientMass Plan Action Tracker which provide access to climate data and progress reports on resilience actions to the public, respectively ("2023 ResilientMass Plan," n.d.). Additionally, in November 2023 the Executive Office for Energy and Environmental Affairs released a request for quotes for the "ResilientMass

Metrics" project, which will develop a framework and set of metrics for assessing the efficacy of state and local resilience initiatives (Executive Office of Energy and Environmental Affairs 2023). The state also has an Environmental Justice (EJ) policy, which aims to "better serve the environmental needs of the Commonwealth's most vulnerable residents", especially communities with high concentrations of minority populations, low-incomes, or limited English language proficiency ("Environmental Justice Policy | Mass.Gov," n.d.). These actions, paired with various grant funding opportunities detailed below, have paved the way for more resilience-related projects at the municipal level, including resilience hubs.

The Municipal Vulnerability Preparedness (MVP) program is likely the most well-known state funded resilience grant program in Massachusetts. MVP funds vulnerability assessment and resiliency plan development for cities and towns, action grants to implement priority projects for municipalities with completed resilience plans, and most recently MVP 2.0, which funds convenings of community stakeholders to identify and implement projects that address the root causes of social and climate vulnerability ("Municipal Vulnerability Preparedness Program," n.d.). MVP Action Grants are a significant source of funding for municipal resilience projects in Massachusetts, and the grant criteria include ("MVP Action Grant | Mass.Gov," n.d.):

- Increasing equitable outcomes for Environmental Justice (EJ) and other priority populations and addressing the root causes of social vulnerability
- Conducting robust community engagement and supporting strong partnerships with EJ and other priority populations
- Building community capacity for climate resilience

MVP Action Grants have funded a range of resilience projects in Cambridge and Medford, including most of Medford's resilience hub community engagement efforts. Other relevant funding programs include the Office of Coastal Zone Management's Coastal Resilience Grant Program, the Metropolitan Area Planning Council's (MAPC) Accelerating Climate Resilience Grant Program (ACR), the Community Clean Energy Resiliency Initiative and other longstanding funding programs like FEMA's Building Resilient Infrastructure and Communities (BRIC) grants.

As evidenced by these many grant programs, and the influx of climate-related funding from the federal Inflation Reduction Act, Massachusetts municipalities are awash in opportunities to plan and fund projects to improve the community resilience of their residents and neighborhoods.

Emergence of the Resilience Hub Concept

Mirroring the rise of resilience planning and funding is the rise of resilience hubs. While the idea of trusted community spaces that people turn to during natural disasters is not new, the recent wave of resilience hub projects began in Baltimore, Maryland in 2014, when the city's Office of Sustainability was working on an emergency preparedness initiative for residents in neighborhoods vulnerable to climate impacts (Baja 2019). Kristin Baja, former Baltimore Office of Sustainability staff and later Director of Support and Innovation at USDN, has been a key thought leader in developing the USDN's framework for resilience hub development. The USDN framework, modeled off resilience hubs in Baltimore, is commonly cited in resilience hub plans across the country, and three resilience hub projects that follow the framework are featured on the USDN resilience hub website. These three featured projects (Cambridge Community Center in Cambridge, Boyle Heights Arts Conservatory in Los Angeles, and the Faunteroy Community Enrichment Center in Washington D.C.) are some amongst many resilience hubs being implemented in the US. A 2022 article from the Rocky Mountain Institute counted at least 26 resilience hubs either existing or in development across the country (Mills 2022). Because the USDN framework is increasingly ubiquitous amongst municipal resilience hub initiatives, this research will focus on resilience hubs that generally conform to this framework.

At a high level, resilience hubs are community-facing facilities that serve resident needs before, during and after a disaster, a definition that leaves lots of room for customization based on local conditions. The USDN's framework document, *Guide to Developing Resilience Hubs,* further clarifies the programs and characteristics of a resilience hub in the following ways. The framework outlines three 'functioning modes' for resilience hubs:

- **Everyday:** services that work to address root causes of vulnerability amongst residents.
- **Disaster:** a central location for assessing impact, communications, distributing resources and spearheading responses to disasters.
- **Recovery:** services that provide ongoing recovery information, space for experts and other air organizations, and continued provision of resources after a disaster.

Additionally, the USDN framework outlines five core components for resilience hub operations:

- **Resilient Programming and Services:** Offering additional services and programs that build relationships, promote community preparedness, and improve residents' health and well-being.
- **Resilient Structure:** Strengthening the resilience of the facility to ensure that it meets operational goals in all conditions.
- **Resilient Power:** Ensuring reliable backup power to the facility during a hazard while also improving the cost-effectiveness and sustainability of operations in all three operating modes.
- **Resilient Communications:** Ensuring the ability to communicate within and outside the service area during disruptions and throughout recovery.
- **Resilient Operations:** Ensuring personnel and processes are in place to operate the facility in all conditions.

These operation modes and core components provide structure for developing resilience hubs, while still allowing flexibility and room for customization based on local community needs. The USND framework defines six phases to implementation, starting with vulnerability assessments and selecting a project team, through site evaluation and activating site operations (Baja 2019). Two major themes throughout the framework are relying on local knowledge to inform programming through community engagement and shifting power to neighborhoods and residents' by selecting a project team that includes community members, CBOs, and other experts (Baja 2019).

Often referenced as the city to first develop resilience hubs, Baltimore provides a clear example of a robust network of resilience hubs spread across the city. In Baltimore's network of 18 resilience hubs, existing CBOs who serve under-resourced neighborhoods partner with the City to provide residents with resources, information and shelter in times of disruption (City of Baltimore 2021). Resilience hubs, in turn, receive funding, emergency preparedness supplies,

staff training and renewable energy plus battery storage capabilities from the City (City of Baltimore 2021). To date, four resilience hubs in the network are fully outfitted with solar power and battery storage, while another four are slated to receive those building upgrades in the future (City of Baltimore 2021). Although most other cities do not yet have a network with multiple resilience hubs, Baltimore can serve as a model for understanding the potential for city-wide reach for a resilience hub program.

Resilience Hubs in Massachusetts

With growing interest in resilience hubs and more grant funding opportunities, some municipalities in Massachusetts have started to develop their own resilience hub programs. Most notably, Cambridge and Medford are in the process of planning and implementing resilience hubs to serve their residents who are most vulnerable to climate disruptions, like low-income residents, residents of color, and people who experience linguistic isolation. Municipal governments and CBOs in Northampton and New Bedford have also been exploring the development of resilience hubs. Northampton started planning their resilience hub in 2020 and have recently acquired a building that will be converted into a resilience hub ("Community Resilience Hub | Northampton, MA - Official Website," n.d.). New Bedford's initiative began in 2020 with the intention of converting the vacant Capitol Theater into a resilience hub to support economic and social resilience ("New Bedford Capitol Theater Redevelopment," n.d.). These two cases were excluded from this research because there was little substantive information about their development publicly available and including four case studies would have overextended the scope of the thesis.

Beyond municipally led resilience hubs, it's important to recognize the work of the organization Communities Responding to Extreme Weather (CREW) and their efforts to establish a different kind of resilience hub throughout the state. CREW establishes 'Climate Resilience Hubs' and defines them as "community institutions that help educate residents about extreme weather

preparedness and other impacts of climate change”(CREW, n.d.). CREW’s climate resilience hubs’ main requirement is to provide communication materials to residents to educate them on extreme weather preparedness. Their hubs also have the option of providing community members material assistance during extreme weather events, but this element is optional. Because CREW’s model focused on providing information rather than direct provision of services and building upgrades, their network of resilience hubs are not included in this thesis research.

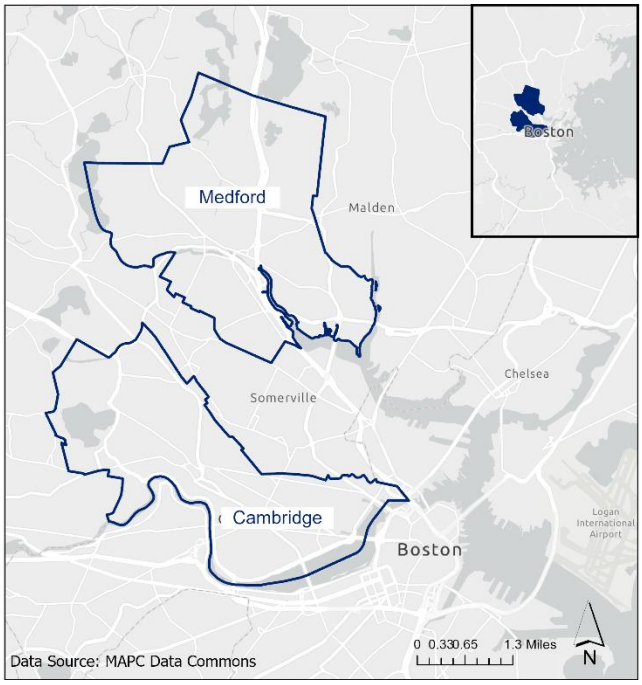

Figure 2: Map of Cambridge and Medford (Map by Author)

This thesis will focus on the resilience hubs being developed in Cambridge and Medford (figure 2). Cambridge’s resilience hub pilot, which began in 2019, is housed in the Cambridge Community Center (CCC). CCC is partnering with the City of Cambridge and Climable, along with various other funders, and the work has mostly consisted of planning for energy resilience building improvements. In Medford, resilience hub planning began in 2020 and is spearheaded by the City of Medford. Thus far, the project has consisted mainly of community engagement with residents and CBOs, although more recently the City has identified a physical space for their resilience hub.

Both Cambridge and Medford were inspired to start resilience hubs by the USDN framework and have referenced the framework extensively in their planning (Breton-Carbonneau and Griffiths 2020; Kim Lundgren Associates 2019). Despite being in the same metro area and drawing inspiration from the same source, each city has taken a different approach to

developing resilience hubs. While Cambridge started by identifying an existing community space, already trusted by the community, Medford started by developing buy in for the idea of a hub and only later has identified a currently unused building to create a resilience hub from scratch. These differences allow for interesting comparison between the two cases and show that there is no one ‘correct’ way to approach resilience hub development.

This thesis explores how both Cambridge and Medford are developing resilience hubs within the context of other adaptation planning efforts. Chapter 2 explains the research methodology and methods used, including the case study format, semi-structured interviews, and content analysis. Chapter 3 is a literature review of key concepts like climate impacts in Massachusetts, existing climate adaptation planning practices, community resilience theory and community engagement in resilience planning, which inform the case study analysis. Chapter 4 includes the case studies for Cambridge and Medford, detailing content analysis and interview findings for each. Chapter 5 analyzes the case study findings and delves into the ways that resilience hubs in Cambridge and Medford were informed by climate impact data from previous municipal adaptation plans, created avenues for strengthening bridging and linking social capital amongst residents, CBOs, and local government, and used more equitable community engagement methods that allow for greater agency and participation from residents. Chapter 6 includes key take aways from the research and provides recommendations for practitioners like prioritizing information gathered directly from residents in resilience hub development, framing resilience hubs as more than climate-adaptation projects to better connect with vulnerable residents and promote de-siloed work across municipal departments, using linguistically inclusive and less traditional forms of community engagement and critically assessing the long-term capacity of CBOs chosen as resilience hub sites.

Chapter 2: Methods

This thesis used a mix of qualitative research methods, including a literature review, semi-structured interviews, and content analysis, to understand the processes through which resilience hubs are being developed in Cambridge and Medford. Qualitative research focuses on uncovering the complexity of a situation and inductively creating meaning out of the data collected (Creswell 2018). Resilience hubs exist at the intersection of systems of municipal governance, provision of social services through CBOs and community building among residents, a network whose complexity cannot easily be captured through one singular qualitative method.

Methodology

This thesis is grounded in feminist theory, which recognizes that knowledge is constructed and deeply influenced by people's relationship to power (Rose 1997). Reflexivity, the practice of acknowledging the researchers own role and influence on the research, and positionality, recognizing how people's racial, gendered and other social identities affect research findings and outcomes, are both staple practices in feminist theory (Rose 1997). Acknowledging the reflexivity and positionality of the researcher, in addition to research participants, is a critical step in feminist theory in order to address how knowledge is partial, specific and cannot be construed as universally applicable (Rose 1997). My own positionality as the researcher includes being a graduate student at Tufts, with access to the power, resources and prestige associated with academia. I am also a student of mixed ethnicity, and my experiences living within communities of color coupled with attending and working in predominantly white institutions has deeply shaped my interest regarding how a community's needs and desires are identified and valued by the institutions that govern them. My interest in resilience hubs specifically began as an intern for the Metropolitan Area Planning Council, where I worked on

the Accelerating Climate Resilience project, which has provided funding to the resilience hub projects in both Cambridge and Medford.

Grounded theory is another theoretical underpinning for this thesis. Grounded theory describes an emergent, qualitative style of research where preconceived ideas about the data are minimized, data collection and analysis are done simultaneously to inform one another, and the researcher remains open to varied understandings of the data collected (Hesse-Biber and Leavy 2008). Employing grounded theory can be an iterative process, where the researcher chooses “specific methodological strategies to handle puzzles and problems that arise as inquiry proceeds.” (Hesse-Biber and Leavy 2008, p.156). The use of various methods in this thesis reflects both grounded theory and feminist theory. Rather than relying solely on published government reports, which could easily be upheld as the official source of knowledge about resilience hub processes, interviews were included to add a more contextual and embedded source of knowledge to the data and paint a more nuanced picture about resilience hub development.

Literature Review

Although a grounded theory approach may not always include an initial literature review, one was included here to follow the tenets of informed grounded theory which uses extant literature and theories as a heuristic tool to “focus the attention on certain phenomena, aspects or nuances as well as imaginarily see beyond data” (Thornberg 2012, p. 249). Because of the position resilience hubs occupy at the intersection of work on community resilience, community engagement practice, climate mitigation and adaptation, and emergency preparedness, delving into the existing research on those topics helped focus the research questions and data analysis. More specifically, the literature review first identified the well-understood ways that traditional resilience planning work fails to adequately address community resilience needs, and

second identified an initial set of themes and concepts used for interview coding and content analysis.

The literature review includes academic literature and gray literature such as government reports, municipal plans, frameworks, and toolkits from governmental bodies and other professional organizations. Academic literature was identified using search terms like “climate resilience planning”, “community resilience”, “social capital in climate resilience” and “resilience hubs”, in addition to including relevant academic literature from my own previous coursework in graduate school. The gray literature search was guided by looking at documents that specifically discussed resilience hubs, such as from USDN, were Massachusetts state plans, were local plans from Cambridge and Medford, or were frameworks related to equitable community engagement practices. Major themes explored included mentions of or strategies to address community resilience (McDonnell et al. 2019), metrics and methods through which resilience is evaluated (Clark-Ginsberg et al. 2020), and community participation in hazard mitigation and resilience planning (Frazier et al. 2013), among others.

Case Studies

The main body of research is structured around two case studies: Cambridge and Medford. Case studies are in-depth investigations of phenomena that situate them in their real-life context and generally use multiple forms of data collection to inform the investigation (Priya 2021). Case studies are a useful research strategy because they focus on contextualizing the case study subject and allow for in-depth exploration of research questions within that context (Priya 2021). Case studies were a useful format for scoping and organizing this thesis, especially because resilience hubs are inherently place-based solutions influenced by the local context around them. There are a handful of municipalities in Massachusetts that have considered or begun developing resilience hubs, but Cambridge and Medford were selected as study sites because

they are further along in the development process than municipalities like Northampton and New Bedford, among others.

Both Cambridge and Medford's resilience hub projects exist in similar contexts: Boston metro area cities, comparable climate challenges, similar political and regulatory contexts, etc. These sites work well as comparative case study examples because, while they are contextually similar, they have taken different approaches to resilience hub development. Cambridge began by identifying existing community centers already providing community resilience related services and enhancing those spaces to become resilience hubs. Medford, on the other hand, started without an existing community center and focused instead on building a resilience hub from scratch based on extensive community engagement efforts. This distinction makes these case studies ideal for developing recommendations for a variety of resilience hub approaches, especially since both approaches are acknowledged in the USDN framework for resilience hub development (Baja 2019).

Semi-Structured Interviews

Semi-structured interviews were conducted with six key informants including municipal staff, consultants, and CBO staff, from Medford and Cambridge as the primary research method for this thesis. A full list of interviewees is included in Table 1. In qualitative research, semi-structured interviews are used to understand the complexities of a phenomenon by delving into people's experiences and perceptions, which is especially relevant when research is grounded in valuing the ways that knowledge is socially constructed (Brinkmann and Kvale 2018). Approval to conduct this research was obtained from Tufts University's Institutional Review Board (ID: STUDY00004723) prior to any interviews being conducted, and a list of interview questions can be found in Appendix A. It should be noted, however, that because the interviews were semi-structured, the questions in Appendix A are only a guide, and not an exhaustive list of all interview questions asked.

Table 1: Interviewees

Organization	Title
City of Medford	Director of Planning, Development and Sustainability
City of Medford	Health Department Director
ACBC Consulting	Consultant
City of Cambridge	Sustainability Planner
City of Cambridge	Energy Planner
Cambridge Community Center	Executive Director

Initial review of publicly available reports on resilience hub projects in Cambridge and Medford revealed that little information pertaining to the research questions was included in those reports, thus indicating a need for in-depth interviews to better answer the research questions. The interviewees had all been deeply involved in planning and developing resilience hubs in Cambridge and Medford. Initial interviewees were identified based on municipal staff and CBO partners named in publicly available resilience hub reports and additional interviewees were identified through snowball sampling. Interviewees were contacted via email to gauge interest, schedule interview times and sign interview consent forms. Interviews were about 60 minutes long, on average, and questions were open ended and centered around understanding the processes through which community resilience needs were identified and the way in which community feedback was incorporated into the planning process.

A summary notes document was produced for each interview and sent to the interviewee for review and edits prior to coding. Additionally, any direct quotes were approved by the interviewee before being included in the thesis, and all interviewees were sent the final thesis upon completion. Summary notes were coded in NVivo version 1.7.2 to identify key phrases and sentences pertaining to the research questions. Some codes were pre-identified based on results of the literature review, including terms used in the USDN Resilience Hub framework, and other emergent codes were identified during the coding process. A full list of codes and associated definitions used for interview analysis is included in Table 2.

Table 2: Interview Analysis Codes

Code	Definition
Other Community Resilience Efforts	Plans or programs established by municipal government or CBOs designed to understand or improve community resilience attributes
Gaps	Community needs that were not well served, or not served at all, by existing efforts
Social Capital	Existence, or lack thereof, of relationships between residents and government, government and CBOs, CBOs with each other or CBOs with residents.
Community Input	Information gathered directly from residents or CBOs
Everyday Services	Examples of community engagement brainstorming or informing programming and services for “everyday” community needs.
Disruption Services	Examples of community engagement brainstorming or informing programming and services for “disruption” community needs.
Recovery Services	Examples of community engagement brainstorming or informing programming and services for “recovery” community needs.
Resilience Hub Locations (emergent)	Examples of community engagement brainstorming potential locations for resilience hubs

Content Analysis

While resilience hubs are an inherently local and place-based solution, they exist within a larger context of government plans and regulations. To provide contextual and situational information about the political environment within which resilience hubs are being developed, content analysis of select local plans and reports was included. Content analysis is the systematic evaluation of messages in textual documents and other types of media to identify words, themes, and concepts used, as well as their meanings (Stemler 2001). Codes are developed to analyze the appearance of and relationships between those words, themes, and concepts, in order to make inferences about the documents themselves and their intentions (“Content Analysis” 2016).

For each case study, published documents about each resilience hub project were coded and analyzed using the same codes as interviews, in order to maintain consistency in findings about resilience hub work. Additionally, local level climate vulnerability assessments and climate action or resilience plans were reviewed using codes based on the 5 Ws framework developed by Meerow and Newell, to assess how each plan conceptualized resilience and to identify gaps

resilience hubs might fill (Meerow and Newell 2019). A full list of documents analyzed is included in Table 3. The codes used for vulnerability assessments and climate action plans are listed in Table 4. These reports and documents included a wealth of information about community resilience strategies and resilience hub development. Including them in content analysis allowed interviews to focus on collecting information that was not already included in existing documents.

Table 3: Documents Used in Content Analysis

Document Title	Municipality	Year	Document Type	Codes
Resilient Medford: Resilience Hubs	Medford	2020	Resilience hub report	Interview codes
Climate Change Vulnerability Assessment	Medford	2019	Vulnerability assessment	5 Ws framework
Climate Action and Adaptation Plan	Medford	2022	Climate/resilience plan	5 Ws framework
Resilience Hub Business Plan	Cambridge	2019	Resilience hub report	Interview codes
2015 Climate Vulnerability Assessment	Cambridge	2015	Vulnerability assessment	5 Ws framework
2017 Climate Vulnerability Assessment	Cambridge	2017	Vulnerability assessment	5 Ws framework
Resilient Cambridge	Cambridge	2022	Climate/resilience plan	5 Ws framework

Table 4: Content Analysis Codes

Code	Definition	Questions from 5 Ws Framework
Who	Populations for which resilience is being considered or prioritized (Could be as general as the whole city or specific to demographic groups, or a combination of both)	Whose resilience is prioritized?
When	The timeline for which resilience vulnerabilities and actions are considered. (Could be present day, near future, far future, etc.)	Is the focus on short-term or long-term resilience?
Where	The geography for which resilience is being considered. (Could be the whole city, specific neighborhoods, etc.)	Is the resilience of some areas prioritized over others?

What	The impacts or vulnerabilities that resilience is planned for.	What disruptions should the system be resilient to?

Data Analysis

Interview notes, resilience hub documents and local climate-related plans were all coded in NVivo version 1.7.2 using their respective codes and allowing emergent codes to arise as necessary. For interview notes and resilience hub documents, phrases and full sentences were coded, then grouped into categories within each code based on the research question they pertained to and finally tagged with overarching themes. Because each document was labeled as either part of the Medford or Cambridge case study, coding results could be separated by case study when writing up findings. After all coding was complete, interview notes and recordings were reviewed again for direct quotes. All direct quotes were approved by interviewees prior to publication of the thesis. For content analysis of municipal climate action planning documents, each document was reviewed for phrases and sentences connected to codes developed from the 5 Ws framework. Afterwards, coded phrases were grouped based on emergent themes and summarized in the findings chapter.

Chapter 3: Literature Review

This chapter includes a literature review of academic and professional sources pertaining to climate impacts, resilience planning, resilience hub frameworks, community resilience theory, and community engagement in resilience planning, amongst other topics. The information presented here informed analysis of interview and content analysis data and is referenced in the discussion chapter. There is little academic literature on resilience hubs themselves, therefore literature is drawn from a variety of fields in order to support the research questions.

Climate Impacts and Priority Populations in Massachusetts

The 2022 Massachusetts Climate Change Assessment and 2023 State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) extensively cover the varied and intense impacts that climate change is projected to have on the state. Summer temperatures and humidity are expected to rise and the number of days over 90°F will become more frequent, there will be fewer rainy or snowy days, but days with precipitation will be more intense, and sea level rise will continue to affect the Massachusetts coastline ("Massachusetts Climate Change Assessment" 2022). These changes will have widespread negative impacts on buildings, transit and other infrastructure, in addition to degrading coastal and inland ecosystems ("Massachusetts Climate Change Assessment" 2022). Additionally, state and local governments are projected to have reduced revenues, higher costs for responding to climate impacts, and potential delays or disruptions in emergency response systems ("Massachusetts Climate Change Assessment" 2022). Less visible are the cognitive and other health effects that extreme heat and poor air quality are expected to affect populations across the state ("Massachusetts Climate Change Assessment" 2022).

Climate impacts are not equally distributed across all Massachusetts residents, and the state's Environmental Justice Policy from the Executive Office of Energy and Environmental Affairs recognizes that environmental burdens disproportionately fall on low-income communities of

color (“Environmental Justice | Mass.Gov,” n.d.). The state formally recognizes census block groups as Environmental Justice (EJ) populations if annual median income (AMI) is less than 65% of the statewide AMI, minorities make up more than 40% of the population, 25% or more households lack English language proficiency, or some combination of the three (“Environmental Justice Populations in Massachusetts | Mass.Gov,” n.d.). The 2023 SHMCAP recognizes that EJ populations live and work in buildings that are at 57% higher risk of flooding, are most likely to be affected by heat waves, and are increasingly exposed to severe weather events (“ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan” 2023). Each of these impacts require specialized solutions, but the state is prioritizing adaptation to climate risks with disproportionate impacts because of their effects on EJ and other priority populations (“ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan” 2023; “Massachusetts Climate Change Assessment” 2022).

Existing Climate Adaptation Plans and Programs

Hazard mitigation and climate adaptation planning happens at the federal, state, and local levels within the United States, governed by a host of congressional acts, grant programs, and state and local action plans. Policies and funding opportunities at the federal level set requirements and influence actions that states and municipalities take, although the flexibility and autonomy afforded to municipalities also allows for more direct action at the local level.

The Federal Emergency Management Agency (FEMA) carries out federal level hazard mitigation and disaster risk reduction actions through two main avenues: pre-disaster grant programs and post-disaster assistance. FEMA distributes funding through a variety of pre-disaster grant programs which support actions that “reduce or eliminate long-term risk to people and property from future disasters” from state, local, tribal, and territorial governments (“Summary of FEMA Hazard Mitigation Assistance (HMA) Programs” 2023). One of FEMA’s

main grant programs that specifically addresses resilience in climate adaptation is the Building Resilient Infrastructure and Communities (BRIC) program, which specifically funds projects that proactively invest in community resilience, as opposed to reactive disaster mitigation projects (Clancy et al. 2022). FEMA also administers other hazard mitigation grants that help rebuild infrastructure and buildings damages during disasters or that provide recovery assistance for specific hazards such as flooding and wildfire.

At the state level, in Massachusetts specifically, the Massachusetts Emergency Management Agency (MEMA) and the Executive Office for Energy and Environmental Affairs (EEA) are the two major agencies involved in hazard mitigation and climate adaptation. The 2023 State Hazard Mitigation and Climate Action Plan (SHMCAP) is the main report that governs funding and programs for adaptation within the state. The 2023 SHMCAP organizes climate-related risks and impacts into five categories (human, infrastructure, natural environment, governance, and economy) and lays out cross-agency and cross-scale strategies to be implemented across the state to reduce the severity of those climate impacts (“ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan” 2023).

At the local level, two ubiquitous approaches to planning for climate impacts and other hazards are Hazard Mitigation Plans (HMPs) and climate action or resilience plans. Hazard Mitigation Plans are mandated and regulated by FEMA and are required for municipalities to be eligible for any FEMA funding. HMPs are designed to help municipalities plan for or reduce risk from disasters in the long-term and include vulnerability and risk assessments and strategies for disaster mitigation (Matos et al. 2023). While some HMPs include projections about future climate impacts, they often rely on historical data to identify and plan for hazards.

Climate action and resilience plans are a more recent development in planning for climate impacts and are not mandated by state or federal agencies, leading to a diversity of approaches

to their development (Stults and Woodruff 2017). Climate action plans typically focus on mitigating climate change by planning for reducing carbon emissions while climate resilience plans focus on adapting to the effects of climate change, current and future (Lambrou and Loukaitou-Sideris 2022; Matos et al. 2023). Elements of these plans typically include community engagement processes, greenhouse gas emissions inventories, climate vulnerability assessments, and development of mitigation or adaptation related goals and strategies (Lambrou and Loukaitou-Sideris 2022; Matos et al. 2023).

While some academic literature draw distinctions between these two types of plans, in practice municipalities often use the terms interchangeably, calling them by different names or combining elements of each into a single plan (Stults and Woodruff 2017). Additionally, there are many municipal plans that may not explicitly mention climate change, such as housing or public health documents, but are tied to resilience planning because of their connections to underlying influences on community resilience (Norris et al. 2008). These types of plans govern actions that impact chronic stressors on individuals that can mediate how severely they are impacted by climate risks, like the availability of stable, quality housing, or access to community health facilities. The connections between chronic socio-economic stressors and community resilience are explored further below.

Gaps in Existing Adaptation Plans and Programs

All the policies, plans and programs outlined in the previous section are responses to the increased threat of climate disasters and most often focus on strengthening physical infrastructure like raising seawalls, improving roads and bridges, or even changing building code requirements. While infrastructural improvements play an important role in resilience, “no amount of investment in physical infrastructure will be able to reduce all risk and eliminate vulnerability” (Aldrich and Meyer 2015, 255). One common critique of hazard mitigation planning is that the approach over emphasizes addressing physical vulnerability to hazards, which is

vulnerability of a population based on its geographic and structural characteristics, and leaves out analysis of social vulnerabilities, like race, class, housing tenure, etc. that can equally influence a community's resilience (Highfield, Peacock, and Van Zandt 2014). If sections on socio-economic vulnerability or social resilience are included, they are likely to be less developed and weaker than other sections of the hazard mitigation plan (HMP) (Frazier et al. 2013).This point is emphasized by the focus on funding infrastructure and physical improvements within FEMA's pre- and post-disaster grant programs.

Within FEMA's range of programs, many focus on providing post-disaster funding, which may disincentivize municipalities from investing in more costly and time-intensive mitigation projects when coupled with tight budgets and potential political pushback (Frazier et al. 2013). FEMA's BRIC grant program, which does fund mitigation efforts, is not fully exempt from the same downfalls. A report evaluating social equity within the BRIC program found that, even though FEMA had publicly recognized the role of social factors in community resilience, BRIC program criteria focused solely on physical systems and made "no mention of the social systems that are also a key part of effective mitigation efforts"(Clancy et al. 2022, 25).

Resilience and Climate Action plans are not as strictly prescribed as HMPs, and contend with the broader idea of adapting to climate risks over the long term, rather than focusing specifically on mitigating disaster risk (Matos et al. 2023). As such, climate adaptation and resilience plans generally include analysis of both physical and social vulnerabilities, with a focus on strategies to lessen negative impacts in the short-term and mitigate climate impacts in the long-term (Stults and Woodruff 2017; Matos et al. 2023). Additionally, adaptation and resilience plans often include goals and strategies to address the unequally distributed effects of climate change (Lambrou and Loukaitou-Sideris 2022). Despite including more recognition of social vulnerability and distributional inequities, research has found that adaptation plans generally used definitions of resilience that prioritizes returning to the status quo after disruptions and missed opportunities

to encourage transformative action that might address the roots of social vulnerabilities (Lambrou and Loukaitou-Sideris 2022). The same analysis found that plans often included broad goals related to promoting equity through social resilience, but had relatively few strategies to achieve equity and were unclear about equity within which sector of urban life they were referring to (Lambrou and Loukaitou-Sideris 2022). This finding supports other research that showed that many resilience plans devoting more attention to identifying vulnerabilities and stating goals than to crafting strategies and implementation steps (Stults and Woodruff 2017).

Public participation in climate adaptation and resilience plans tends to be more robust than in HMPs, involving a wider array of planning practitioners and involvement from non-governmental organizations (Matos et al. 2023). In fact, resilience plans often included fairly extensive public engagement plans featuring engagement methods like public surveys, some public meetings and topic-specific focus groups, along with citizen oversight committees (Lambrou and Loukaitou-Sideris 2022). Despite most plans having extensive engagement, research found that it was often "not clear how the participatory nature of plan development translates into goals and implementation strategies" (Lambrou and Loukaitou-Sideris 2022, p. 827). This might be connected to the way that resilience plans' equity goals generally focus more on the distributional inequities in climate impacts rather than procedural inequities in representation and community agency that perpetuate unequal climate impacts (Lambrou and Loukaitou-Sideris 2022).

It is important to note that while HMPs and resilience plans have different focuses and unique shortfalls, there is literature supporting the idea that combining these two kinds of plans may be beneficial for building resilience (Matos et al. 2023). It is uncommon for municipalities to combine these two kinds of plans, but since they share similar goals of reducing damage from climate impacts and building capacity to deal with future impacts, they should not exist in separate siloes (Matos et al. 2023). When considered as two parts of a whole, these plans could

result in more comprehensive actions for reducing risk and building resilience, in addition to potentially opening up additional funding opportunities (Matos et al. 2023). These connections may also be beneficial in the context of resilience hubs, since they are designed to bring together community resilience, disaster preparedness and long-term transformation in the face of climate impacts.

Resilience Theory and Community Resilience

'Resilience' is a term increasingly used in climate-focused work, and while it has traditionally been used to refer to an ecological system or physical infrastructure's ability to return to a steady state after a disturbance, more recently it has been used to analyze the relationships between social and environmental systems during disturbances (Cote and Nightingale 2012). As resilience is applied to urban contexts, more attention is being paid to the idea of community resilience, which "describes the collective ability of a neighborhood or geographically defined area to deal with stressors and efficiently resume the rhythms of daily life through cooperation following shocks"(Aldrich and Meyer 2015, 255). "Shocks" to a community can range from natural disasters to public health crises like the COVID-19 pandemic, to political unrest and are not necessarily climate change-related. Additionally, community resilience can also encompass a 'bounce forward' mentality that imagines how resilience can be used to address inequities in the status-quo state, rather than simply returning to business-as-usual, as approach that is critical to transformation of socio-economic and ecological systems through resilience work (Bahadur and Tanner 2014).

Because resilience is used across so many contexts and without a singular definition, defining who is to be made more resilient and resilient to what events or factors is a critical step for practitioners when establishing resilience goals (Meerow and Newell 2019). Meerow and Newell's 2019 framework for conceptualizing urban resilience poses the "5 W's of resilience": Resilience for whom? Resilience of what to what? Resilience for when? Resilience for where?

Why resilience? Each of these questions helps bring specificity, definition, and direction to the use of resilience as a normative concept in practice. The malleability of resilience as a concept is beneficial in collaborative settings because stakeholders with differing perspectives may see their own goals reflected in resilience as a guiding principle (Meerow and Newell 2019). That ability to bring stakeholders together is pertinent in the context of resilience hub development, which often brings together stakeholders across government, community organizations, neighborhood groups, etc. However, too much ambiguity in what resilience means within the context of a particular project can make it difficult to operationalize ‘resilience’. The questions in the 5 W’s framework offer a roadmap for thinking through the inherent tradeoffs between groups, geographies and scales that come with collectively defining resilience. By thinking holistically about what resilience means, bounded by specific populations and geographies, the concept can be better understood, measured, and used to achieve particular goals.

The primary non-ecological underlying factors that strongly influence community resilience include housing stability, access to transportation, income and wealth, and other social determinants of health (Norris et al. 2008; Wilken et al. 2023). People and households dealing with these intractable issues are dealing with ‘chronic stressors’ that impede their ability to be resilient in the face of shocks, thus reducing community resilience overall. Dealing with unstable housing or jobs, living at or under the poverty line, have unreliable access to transportation, lacking health insurance, and various other social factors increase the likelihood of mortality, morbidity, and property destruction for a community during a shock, and also make post-disaster recovery more difficult (Shokry, Anguelovski, and Connolly 2023). The complexity of interconnections between these ecological and socioeconomic systems means that “promotion of urban resilience will thus require that cities become resilient to a wider range of overlapping and interacting shocks and stresses”(Bahadur and Tanner 2014, 203).

Social capital, social infrastructure, and community cohesion are three key characteristics recognized in the literature that improve resilience during acute climate-related shocks. Social capital encompasses how participation in groups and networks of relationships positively impacts individuals, which can happen at various scales (Aldrich and Meyer 2015). Close emotional relationships between individuals are considered bonding social capital, loose relationships with others in an identity group or organizations are bridging social capital, and connections between citizens and power structures like government are called linking social capital (Aldrich and Meyer 2015). These three kinds of social capital help individuals access resources and aid in times of disturbance, as shown in figure 3. The development of social capital, especially bridging and linking capital, is aided by the existence of social infrastructure, or physical spaces open to all where people can interact with others from their community (Klinenberg 2018). Community centers, libraries, churches, and other neighborhood gathering places, where resilience hubs are often located, are prime examples of social infrastructure.

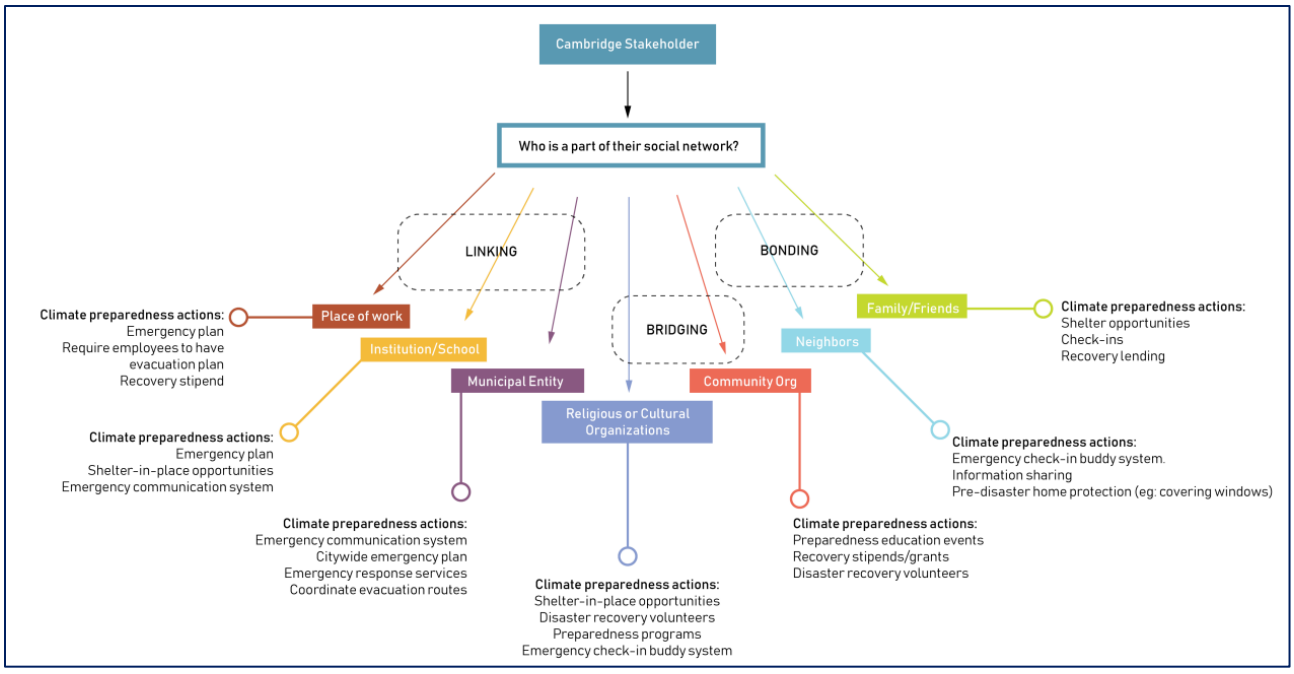

Figure 3: Chart depicting different forms of social capital and their relationship to climate preparedness actions in Cambridge (Graphic by Kleinfelder. “Resilient Cambridge” [2022]: 19. Graphic courtesy of City of Cambridge.)

Importantly, social capital does not by definition lead to increased community resilience. Literature shows that groups with high levels of social capital can also be highly exclusive, only sharing knowledge, resources and power with those within their identity group (MacGillivray 2018). To better define social capital characteristics that would typically be conceptualized as part of a community resilience, the term ‘community cohesion’ is often used to identify the “extent of connectedness and solidarity amongst groups in a society” and includes measures of trust, reciprocity and solidarity between groups (Carrasco and Bilal 2016, 128). While academic literature often distinguishes between these two concepts, in resilience planning they are frequently used interchangeably, because social capital is often used in a normative way that connotes trust and cohesion between groups. Resilience hubs are framed as sites for building community cohesion by offering space where people can connect with each other casually, connect with community organizations and resources, and ideally be better connected to governing bodies, building community resilience in the process (Baja 2022).

Another key characteristic of community resilience is adaptive capacity, sometimes defined as “resources with dynamic attributes, i.e., resources that are robust, redundant, or rapidly accessible”, meaning resource and systems that are flexible and can respond to changing scenarios and needs (Norris et al. 2008, 131). The presence of adaptive capacity within a city or neighborhood is important for community resilience because dynamic and adaptive systems help communities function during the changing conditions of a disruption and allow for transformation in the face of those disruptions (Norris et al. 2008). As it relates to building community resilience for socially vulnerable populations, adaptive capacity can be thought of as the “hard and soft urban infrastructure” that either materially support residents by providing direct resources, or politically support the maintenance and expansion of supportive services and resident agency (Shokry, Anguelovski, and Connolly 2023). Resilience hubs have been

posited as a solution for increasing adaptive capacity for the communities they serve (Baja 2022).

Equity and Community Engagement in Resilience Planning

Research has long recognized the importance of resident participation in a variety of planning contexts, including in hazard mitigation and climate resilience planning. Community resilience is strengthened when planning processes incorporate local knowledge and allow greater opportunities for resident involvement (McDonnell et al. 2019; Norris et al. 2008). Methods of involving the public in planning processes vary. Arnstein's 'ladder of citizen participation' has been influential in the planning field and outlines a range of participatory methods ranging from simply informing or consulting citizens to shifting decision-making power to citizens directly (Arnstein 1969). Generally, greater levels of public participation are beneficial to resilience planning efforts, because they help identify local concerns and risks, can build trust between the public and government, increases community buy-in for resilience strategies, and can build community capacity (McDonnell et al. 2019). Quantitative data play an important role in identifying climate impacts, but subjective and participatory methods of data collection are better at validating local knowledge of conditions and may do a better job of capturing the complex interactions of multiple systems that affect resilience at the local level (Tariq, Pathirage, and Fernando 2021). Additionally, through increased engagement and participation, community members gain knowledge about governance mechanisms that mediate resilience actions and can better communicate their needs, which may allow for more equitable distribution of resources and efficient policy decisions (McDonnell et al. 2019).

This thesis will use the *Spectrum of Community Engagement to Ownership* (CE2O) framework, developed by Facilitating Power, to analyze resilience hub community engagement activities, a framework that expands upon Arnstein's ladder. This framework is specifically grounded in

principles of racial equity and environmental justice, making it especially relevant to resilience hub work. The CE2O framework categorizes community engagement approaches into five categories, ranging from 'inform' to 'defer to' based on the extent that community leadership, democratic participation, and equitable decision-making are prioritized, shown in figure 4 (Gonzalez 2020). The framework recognizes that direct involvement from communities most impacted by climate change is necessary for "closing equity gaps and resolving climate vulnerability" (Gonzalez 2020, 3). Additionally, each step in the framework is necessary at some point to build the capacity of community members and government to carry out truly collaborative and equitable community ownership (Gonzalez 2020).

Figure 4: Graphic depicting the different stages of community engagement in the Community Engagement to Ownership framework. (Graphic by Facilitating Power. "The Spectrum of Community Engagement to Ownership" [2020]: 5. Courtesy of Facilitating Power)

Despite the benefits of increased public participation in resilience planning, it is important to recognize that participatory processes are not necessarily equitable. Research shows that the people most likely to attend public meetings and other common forms of public engagement tend to be wealthier, more educated residents who have more free time and flexibility to attend meetings (McDonnell et al. 2019; Einstein, Palmer, and Glick 2019). This trend can be detrimental to resilience planning because the voices and concerns of priority populations who

are most exposed and vulnerable to climate disruptions may not be adequately represented through public engagement methods (McDonnell et al. 2019). As equity becomes an increasingly stated value in resilience planning, developing public engagement methods that incorporate the voices of all residents is a growing concern (Lambrou and Loukaitou-Sideris 2022).

As climate work has become increasingly intertwined with social justice movements and seeks to promote equity, linguistically inclusive practices are becoming more widespread in an effort to increase equitable participation and agency among frontline communities (Fine 2022). Research shows that English-only communications are a primary form of exclusion for non-English speakers, essentially gatekeeping climate science, advocacy and policy work from populations who are most affected by climate disruptions (Fine 2022). Additionally, the over-use of technical jargon and dominant English dialects can further exclude marginalized populations, reinforcing the power hierarchies that climate justice work aims to dismantle (Fine 2022). Practices like translating communications materials, conducting outreach in multiple languages, avoiding over-use of jargon and prescriptive language, and using community-based participatory frameworks for engagement are all critical to combating linguistic exclusion in climate work (Fine 2022). Practitioners report that implementing these practices help build agency for frontline communities, trust between those communities and policy organizations, and facilitate relationship building overall (Fine 2022).

Federal disaster management planning and local hazard mitigation plans have long been criticized for their lack of local public participation (McDonnell et al. 2019). Top-down governance approaches, like FEMA, tend not to be well positioned to carry out local level engagement programs, although the agency has begun to incorporate more mentions of public participation into its programs (McDonnell et al. 2019). At the local level, FEMA mandates that local hazard mitigation plans include an opportunity for public input on the plan, with specific

reference to soliciting input from underserved communities, although no specifications are given about what kind of methods should be used for public participation (“Local Mitigation Planning Policy Guide” 2023).

Within resilience plans, public participation varies, as does the extent to which resident ideas and feedback influence the goals and strategies outlined in the plan (Lambrou and Loukaitou-Sideris 2022). A review of 38 municipal resilience plans from across the US found that the most common methods for community engagement were community surveys, community workshops, and town halls or other public meetings (Lambrou and Loukaitou-Sideris 2022). Additionally, while many resilience plans referenced equity as a plan value, most discussed equity in a distributional manner, rather than in a procedural manner that may lend itself to more equitable community engagement processes (Lambrou and Loukaitou-Sideris 2022).

The USDN Resilience Hub framework states that resilience hubs should be “co-developed and co-managed by members of the community and/or community-based organizations” and emphasizes that the project team developing resilience should include members of priority populations who will have greater needs (Baja 2019, 19).

Conclusion

The literature review in this chapter provides a grounded theoretical knowledge base about resilience planning, theory and community engagement which informs the following chapters, including having informed the development of interview and content analysis codes. The following chapter introduces case studies for resilience hub projects in Cambridge and Medford, detailing findings from stakeholder interviews and analysis of municipal plan documents.

Chapter 4: Case Studies

This chapter includes case studies for the resilience hub projects in Cambridge and Medford. The case studies were informed by background research, content analysis of major climate resilience related plans for each city, and interviews with municipal staff and other key informants. The content analysis for both case studies is based on Meerow and Newell's 5 Ws framework with the goal of understanding how each city conceptualized community resilience at a larger scale and clarify how resilience hubs fit into other municipal climate goals. The 5 Ws framework is useful for this analysis because it helps identify implicit and explicit trade-offs and decisions made within the planning documents and if there are gaps in the ways the documents address resilience.

Despite local Hazard Mitigation Plans (HMP) generally being considered part of the ecosystem of local plans related to municipal resilience, HMPs for Cambridge and Medford were excluded from this content analysis because interviewees did not mention that they were relevant to the resilience hub projects. Three key informants were interviewed for each case study and interview results are summarized in relation to the overarching research questions of this thesis. These case studies provide an in-depth narrative about how each city has approached developing resilience hubs, informed both by published reports and practitioner knowledge.

Cambridge

The City of Cambridge has been working to address the effects of climate change for many years with efforts like the Net Zero Plan, published in the early 2010s, and more recent efforts like climate vulnerability assessments and the Resilient Cambridge Plan bringing a climate resilience lens to the City's work ("Climate Change Planning - CDD - City of Cambridge, Massachusetts," n.d.). Building off the information that those plans gathered about climate vulnerabilities, the City of Cambridge has been working with the Cambridge Community Center (CCC) to establish it as a resilience hub for the past several years.

CCC has been serving residents in eastern Cambridge for over 90 years, providing everything from space for community events, childcare, educational classes, food pantry services and more (“About Us,” n.d.). CCC was originally founded in 1929, in response to the local YMCA being a whites-only facility (“About Us,” n.d.). Over the course of its long history, the CCC has become a well-loved and trusted community institution. The Center is located in a part of Cambridge that experiences inland flooding and serves the Riverside neighborhood, where 15% of residents are Black, 3.8% are Hispanic and over 20% are foreign born (Kim Lundgren Associates 2019).

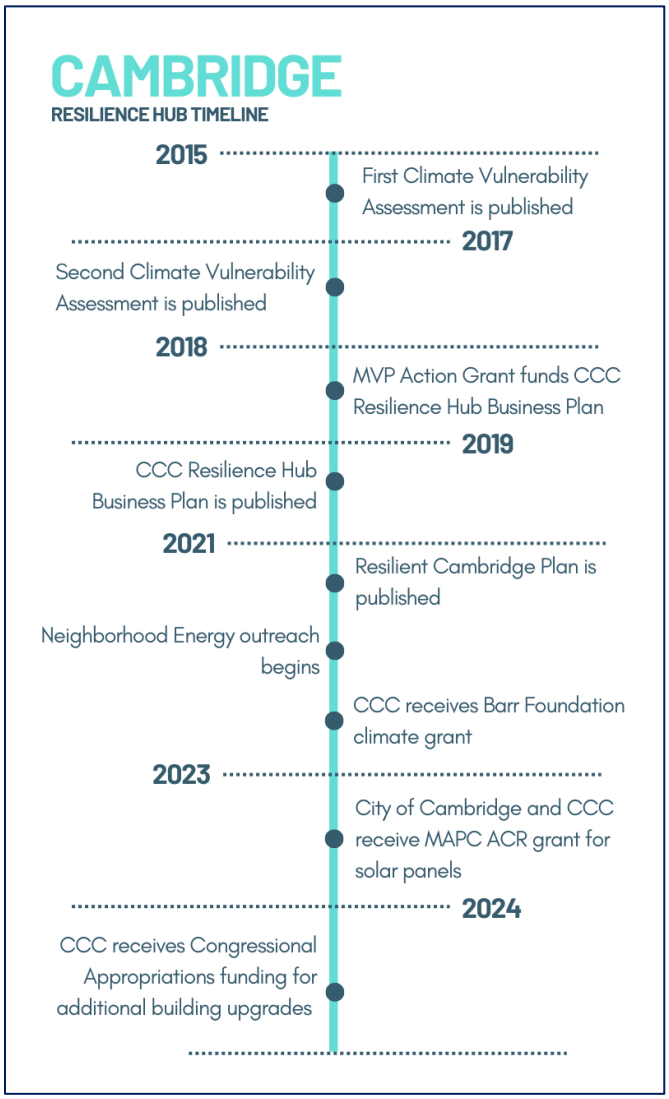

Figure 5: Cambridge Resilience Hub Timeline (Graphic by Author)

When the City began thinking about implementing resilience hubs, CCC was identified as a potential site primarily because of its longstanding, trusted relationship with the local community and because its building, built in the 1880’s, was in need of upgrades (Kim Lundgren Associates 2019). The City was partially inspired to start the pilot project based on USDN’s 2018 white paper about resilience hubs. In 2019, the City and CCC commissioned a Resilience Hub Business Plan for CCC to identify necessary structural and energy improvements in addition to programmatic changes for the center to become a resilience hub. In the years since, CCC has received funding

from other organizations like USDN and the Barr Foundation to plan for further energy resilience improvements for the building (Cambridge Community Center 2023). In 2023, CCC received funding from MAPC's Accelerating Climate Resilience (ACR) grant program to install solar panels on their gymnasium roof ("Accelerating Climate Resilience Grant Program" 2018). Most recently in spring of 2024, CCC was awarded $1 million as part of Congresswoman Ayana Pressley's Community Projects Funding for additional energy resilience measures ("FY24 Community Project Funding," n.d.). A timeline of resilience hub activities in Cambridge is included in figure 5.

Although the CCC is the focus of this case study, the City is also working to improve other CBOs' capacity to serve residents during climate disruptions through the Neighborhood Energy program ("Neighborhood Energy: The Port Microgrid," n.d.). This program is working to establish a microgrid in trusted community buildings across the Port neighborhood. Neighborhood Energy doesn't use resilience hub terminology, but the program's goals are similar to those of resilience hubs, and Cambridge Community Center is serving as a blueprint for other CBOs engaged through Neighborhood Energy. The program is mentioned in this case study where it provides insights into the research questions.

Climate and Resilience Planning in Cambridge

No municipal government or CBO project happens in a vacuum; each is informed and influenced by previous programs and plans. To illuminate the context in which CCC's resilience hub project began, Cambridge's 2015 and 2017 *Climate Change Vulnerability Assessments* along with the *2022 Resilient Cambridge* plan were analyzed through Meerow and Newell's 5 Ws of Resilience framework (Meerow and Newell 2019). These overarching plans have informed the City's approach to resilience hub development, so understanding how they conceptualize resilience and where they may have gaps clarifies how the Cambridge Community Center's resilience hub fits into the City's larger vision.

Resilience for whom?

While Cambridge's climate and resilience plans cover climate impacts and strategies applicable to the whole city, the *Resilient Cambridge* plan states that it "intends to elevate the voices of those who are often marginalized and prioritize strategies that empower and protect residents who are at risk" (City of Cambridge 2021 p. 14). The *Resilient Cambridge* plan defines people with the following characteristics as marginalized or at greater risk of climate impacts: experiencing housing insecurity, income below the poverty line, low educational attainment, limited English literacy, disability, young children, seniors, and household social isolation (City of Cambridge 2021). A similar set of socially vulnerable groups are mentioned in the 2015 and 2017 *Climate Vulnerability Assessments.* All plans reviewed included demographic data about race and ethnicity in their analysis of socially vulnerable groups, summarized in figure 6. Interestingly, Cambridge does not specifically use the state Environmental Justice criteria to identify priority populations, although there is a fair amount of overlap between characteristics of vulnerability used in both. This may be because, by the State's criteria, almost all of Cambridge's census tracts are considered EJ tracts in terms of minority populations, with a few tracts qualifying under multiple criteria. Therefore, using state criteria may not be as useful for identifying priority populations or geographies within Cambridge.

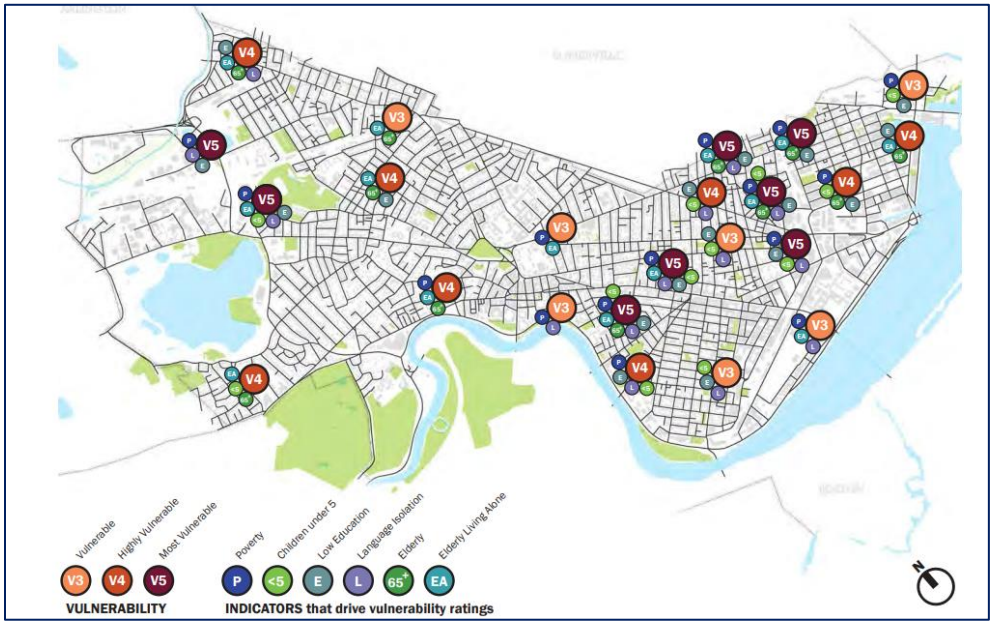

Figure 6: Map showing populations vulnerable to climate change impacts in Cambridge. (Graphic by Kleinfelder. "Climate Change Vulnerability Assessment" [2015]: 31. Map courtesy of City of Cambridge.)

It's much more challenging to piece together who was involved in developing Cambridge's plans and to what extent community members or priority populations helped conceptualize resilience in these plans. Community engagement for the 2015 and 2017 vulnerability assessments included two advisory committees who guided methodological decisions and generally provided input, in addition to over 40 community meetings where the public learned about the vulnerability assessments and provided input. The Resilient Cambridge plan does not specify any additional community engagement conducted during its development, and it is implied that engagement from the vulnerability assessments influenced Resilient Cambridge as well. These activities indicate that the community was informed and consulted, but it is unclear how much decision-making power these activities gave residents.

Resilient to what?

Similar to the primary climate concerns at the state level, Cambridge mainly expects to experience extreme heat and flooding from sea level rise and extreme storms as a result of climate change (City of Cambridge 2021). The vulnerability assessments provide detailed projections about the extent and severity of these impacts. Coastal flooding impacts in Cambridge are mediated by the Charles River Dam, which separates the river from Boston Harbor, but

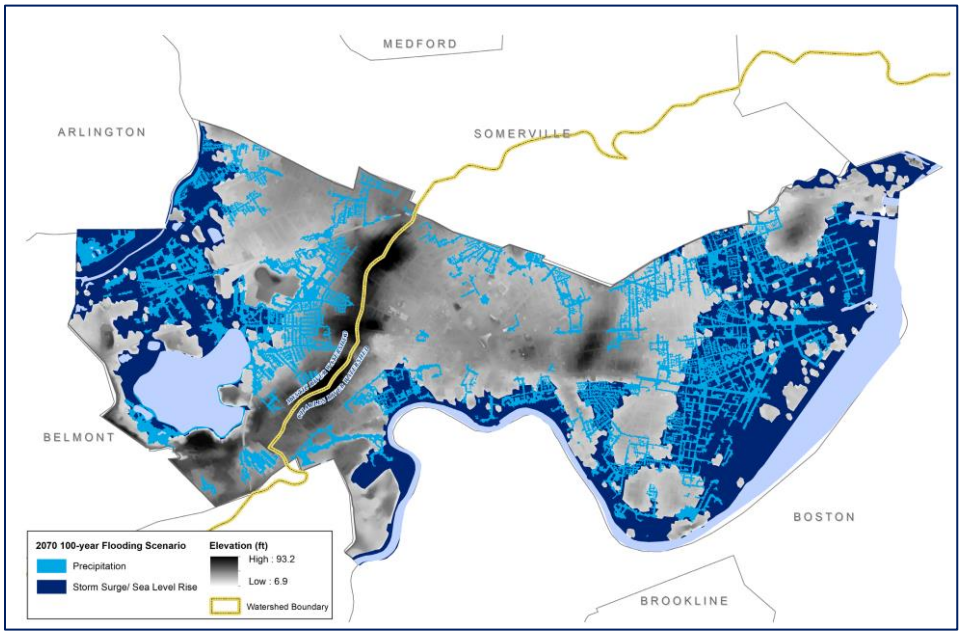

Figure 7: Map showing areas with flooding vulnerability in Cambridge. (Graphic by City of Cambridge. "Resilient Cambridge" [2022]: 10. Graphic courtesy of City of Cambridge.)

extreme storms and sea level rise could cause the dam to be overtopped in projections for 2070, which would lead to severe flooding, shown in figure 7. Extreme storms could cause flooding from heavy precipitation and are expected to become more common over time. The plans also show that by 2030, the City's average summer heat index will be 95° Fahrenheit, rising to 110° by 2070 (City of Cambridge 2021). Figure 8 shows extreme heat impacts throughout the City.

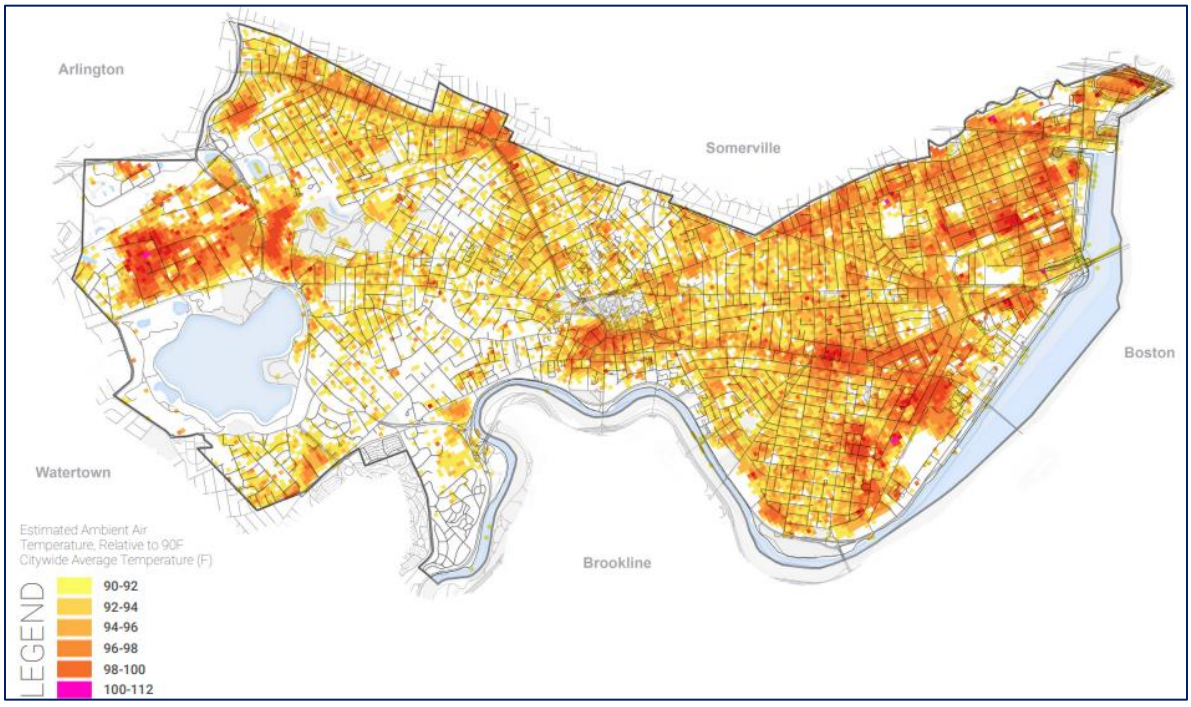

Figure 8: Map showing extreme heat conditions in Cambridge. (Graphic by Kleinfelder. "Resilient Cambridge" [2022]: 13. Graphic courtesy of City of Cambridge.)

Other characteristics that the City has identified as contributing to the overall resilience and wellbeing of its residents include social connectedness or isolation, housing stability, and access to community resources (City of Cambridge 2021). The vulnerability assessments mention the importance of community resources being resilient to climate change, while the Resilient Cambridge plan maps community resources across the city. Despite the inclusion of some social elements in the plans, there is a heavy emphasis on reinforcing infrastructure and buildings to climate impacts throughout the vulnerability assessments and in three out of the

four focus areas of the Resilient Cambridge plan (Better Buildings, Stronger Infrastructure, Greener City).

Resilience for where?

The data used in the climate vulnerability assessments map climate impacts and characteristics of vulnerability across the whole city, but several neighborhoods were identified as experiencing more severe impacts and having decreased access to community resources. The Alewife-Fresh Pond area in western Cambridge and large swaths of eastern Cambridge will experience the worst impacts from flooding caused by sea level rise and severe storms. Additionally, eastern Cambridge neighborhoods like the Port are expected to experience some of the most extreme urban heat island effects in the City. In the *Resilient Cambridge* plan, these climate impacts were overlayed with vulnerable populations and mapped community resources, which identified that The Port, East Cambridge, North Cambridge, and Riverside all had high concentrations of vulnerable populations, but were also well served by community resources. The Wellington-Harrington and Strawberry Hill neighborhoods, on the other hand, had high concentrations of vulnerable populations and limited access to community resources.

Cambridge Community Center is located in the Riverside neighborhood, and while it might seem that prioritizing the development of a resilience hub in either Wellington-Harrington or Strawberry Hill would make the most sense, the City's approach of making already trusted community spaces into resilience hubs lends itself to piloting hubs in neighborhoods with existing community resources.

Resilience for when?

The climate data used in the Cambridge vulnerability assessments includes projections for impacts in 2030 and 2070. Although most of the focus is on these future scenarios, the plans acknowledge that flooding and extreme heat are already impacting the city. The Resilient

Cambridge plan identifies most strategies as broadly “near-term” or “medium-term” with a few longer-term planning strategies, although no specific year estimates are included.

Resilience Hub Stakeholder Interview and Content Analysis Findings

Community Resilience Related Gaps in Cambridge’s Climate Adaptation Work

Discussions about resilience hubs in Cambridge started around 2018, after USDN released a white paper about hubs. City staff began exploring resilience hubs as a strategy for fortifying the climate and energy resilience of community-based organizations in Cambridge. According to one interviewee, some of the City’s previous climate-related plans had focused more on emissions reductions and net-zero initiatives, rather than on resilience to climate impacts, and resilience hubs paired well with the City’s shift in focus to energy and community resilience with development of the Resilient Cambridge plan.

For the Cambridge Community Center, the work of becoming a resilience hub has primarily revolved around shoring up their building so that it can serve community members during climate disruptions. The center’s building is about 140 years old, and during capital improvements planning, staff identified that there were upgrades and maintenance the building would need to even be able to continue normal operations, let alone operate off grid during times of disruption. As CCC’s Executive Director pointed out, the center’s existing programming already works to support the resilience of their community members in myriad ways, but without physical upgrades to the building CCC would have no good way to help community members during an emergency. These necessary improvements include a new electrical system for the building, flood proofing and sump pumps for the basement, a reinforced roof for the gymnasium to hold solar panels, and energy infrastructure like solar panels, backup generators, and battery storage for the building to operate off grid. Pursuing the resilience hub project has given CCC access to support and funding to fill these gaps in their capacity to serve residents.

When deciding on locations to pilot resilience hubs, interviewees all mentioned that CCC was selected in part because the center had long established itself as a trusted neighborhood space. One of the reasons that this relationship is important, as one interviewee pointed out, is that community members are unlikely to trust the City to provide them with resources in an emergency. Interviewees mentioned multiple reasons why residents might not turn to city government in times of need, including no city owned or operated facilities to serve those needs, resident feelings that City government prioritizes the desires of more affluent residents, and feelings of displacement in marginalized communities because of development pressures in areas like Kendall Square. Based on results from this thesis, it's unclear to what extent City staff see limited trust with residents as a gap in their own work. It may be that because there are a host of community organizations like CCC that do have trust with residents, the City can focus on supporting those CBOs rather than building more direct relationships with residents.

Another gap that was discussed by all Cambridge interviewees was that providing one resilience hub for the City would not be sufficient to meet community needs and therefore the CCC resilience hub is considered a pilot project, to be replicated elsewhere. As one interviewee said, CCC can only serve so many people and different community members may feel supported by different CBOs, so having a network of trusted community spaces that can serve residents during disruptions is key. Since CCC's resilience hub work began, the City has established the Neighborhood Energy program, which works to connect trusted community organizations with funding and technical assistance for energy resilience upgrades and becoming part of a Port neighborhood microgrid. City staff interviewed said building relationships with community organizations as part of this project and resilience hubs efforts in general has required lots of consistent outreach because strong relationships with those organizations didn't exist prior to the start of the project.

How Cambridge Identified Community Resilience Needs

According to two interviewees, the findings from these CVAs have since been used to focus the geographic scope of energy resilience projects like the CCC resilience hub and Neighborhood Energy microgrid. Identifying the community resilience needs that would specifically be met through CCC's resilience hub happened two ways: first through a *Resilience Hub Business Plan* that the City of Cambridge commissioned for CCC in 2019 and second through communication between community members and CCC staff. Kim Lundgren Associates wrote the *Resilience Hub Business Plan* and as two interviewees pointed out, was the main avenue through which necessary building improvements were identified. The business plan also identified a few programming suggestions for CCC to improve social resilience for its community members. The Business Plan has facilitated pursuing planning and design for building improvements, in addition to supporting applications for grant funding.

Identification of community members' resilience needs, beyond physical building needs, mostly came from the everyday conversations and interactions that CCC staff have with their community members. So far, developing CCC into a resilience hub has not included traditional community engagement activities like public meetings, focus groups, or surveys. Instead, engagement has happened through the trust and relationships built over time between staff and community members. CCC's Executive Director explained that is because CCC stays responsive to the needs of their community based on what they hear directly from community members. These conversations happen day to day at CCC and sometimes as part of more organized efforts, like during the early days of the pandemic when CCC staff called every family for whom they had contact information to ask what needs they had. While this approach is not as formal as 'traditional' community engagement strategies, it's important to note that these existing relationships and communication channels are the exact reason that the City chose CCC as a pilot resilience hub site. As one Cambridge planner said, "The city is really lucky to have an institution like Cambridge Community Center because they are so deeply involved in

the community, and their willingness and the excitement they have for this project really does matter a lot for its overall success."

As the City has started thinking about expanding similar resilience efforts around the Port neighborhood and developing the Neighborhood Energy program, they have partnered with a local firm called Climable to engage with other community-based organizations and residents. Engagement with residents has focused on learning about people's experiences with climate impacts and gathering information about what CBOs residents would feel comfortable going to and receiving resources from during climate disruptions. Engagement with CBOs, on the other hand, has revolved around gauging their interest in becoming more energy resilient, providing technical assistance to plan for energy resilience improvements, and helping access funding.

How Community Input Has Influenced the Cambridge Community Center Resilience Hub

Because so much of the CCC resilience hub project has revolved around building upgrades, which are informed by technical analysis and engineering design, community input has played a smaller role in informing the project on its face. This is compounded by the fact that the majority of CCC's programing and operations, especially those serving everyday needs, are not changing drastically as a result of the resilience hub project. However, that is not to say that community members have not influenced the project at all, only that its influence is more subtle. Community input has reinforced CCC staff's commitment to serving their community member's needs first and expanding their capacity to provide food assistance, mental health support and other needs as they arise. For example, as CCC's executive director discussed, because some residents feel like 'climate initiatives' in Cambridge are prioritized over their own needs, CCC staff have had to de-emphasize the climate framing in their messaging. They have worked to reassure community members that while the resilience hub project might bring in things like solar panels, these efforts are strengthening the center's ability to serve community members

during times of disruption and that the day-to-day functioning of the center will not change. One interviewee summarized it well saying:

> "Sometimes people, especially people who have been impacted negatively by [climate projects] can think 'oh God here comes more of this environmentally friendly stuff'… and we have to say yeah it's going to be environmentally friendly with solar panels, but it's also about resiliency. Nothing about what we do day-to-day is really going to change, outside of adjusting and adapting to meet as many needs in the community as we can."

This points to an interesting tension between the way resilience hubs are championed as a climate initiative in practitioner and funder circles and feelings of wariness or distrust of climate initiatives amongst marginalized communities.

On a more tangible level, conversations with residents and how community members attend programs at CCC has informed some programmatic changes since the start of the resilience hub project. As a result of phone calls to community members during the pandemic, CCC staff learned that there was a need for safe access to food, so they started a food and supply pantry which has carried on to the present. As two interviewees mentioned, one of the building changes that CCC would like to make is to install a commercial kitchen, so they can meet food-related needs every day and during emergencies to an even fuller extent. Since so many community members came to CCC to meet food and other needs during the pandemic, it reinforced the idea that community members were comfortable coming to CCC in times of crisis, which has influenced other planned changes to the building like an upgraded HVAC system so that the center is capable of sheltering people during an emergency. Additionally, staff heard concerns about mental health from community members and since then CCC has incorporated mental health support and programming into their activities.

The City of Cambridge has not conducted direct engagement with residents for the CCC resilience hub, instead relying on information from previous climate-related plans and CCC staff's understanding of community needs. However, engagement with residents through the Neighborhood Energy program has influenced which community organizations and other

institutions could become future resilience hub and microgrid locations, based on where residents feel comfortable. Engagement with CBOs has helped inform the city about the challenges that organizations face related to becoming more resilient, namely limited staff capacity to take on the project management and fundraising work of energy resilience projects.

Conclusions and Key Themes

Cambridge's previous climate planning initiatives like their climate vulnerability assessments and Resilient Cambridge plan laid the foundation for resilience hub work by identifying major climate impacts to the city and vulnerable populations and neighborhoods to prioritize in climate work. However, these documents are theoretical by nature, setting goals and strategies rather than carrying out direct action to improve community resilience. The CCC resilience hub is a complement to these planning documents because it directly builds resilience for residents more severely impacted by climate disruptions.

One of the main reasons that CCC is well positioned to build resilience is because of their longstanding and trusting relationships with community members that enable staff to be well attuned to community needs and makes CCC a place that residents are already comfortable going to in times of disruption. Having that foundation of trust with community members has allowed CCC to focus on the building and energy system upgrades necessary to turn their facility into a resilience hub, which encompasses most of the work they have done since starting the project back in 2019. The City of Cambridge is using CCC's resilience hub work as a blueprint for other community spaces in the Neighborhood Energy program.

These findings indicate that trust and relationship building are foundational pieces of resilience hub development and that overarching climate planning processes might not be well positioned to build those kinds of relationships. Additionally, the case study provides insights into how municipal governments can collaborate with and support community organizations to become resilience hub sites.

Medford

Medford's government has shown a commitment to mitigating and adapting to climate change through a variety of policies over the years, including a 2013 Local Energy Action Plan and an initial greenhouse gas inventory completed in 2017. The City's Health Department also supports resilience through programs that address the social determinants of health like housing, healthcare, and food access.

The seeds for Medford's resilience hub project were planted in 2018 when the Health Department wanted to change how the City conducted public health outreach. They wanted to shift from a model where residents came to the department for information, to a model where a team of community members could more actively bring information and resources to residents directly. Around the same time, Medford's 2019 *Climate Change Vulnerability Assessment* (CCVA) had recently been published and the 2022 *Climate Action and Adaptation Plan* (CAAP) was being drafted, which both identified major climate impacts on the city and the residents most at risk for those impacts.

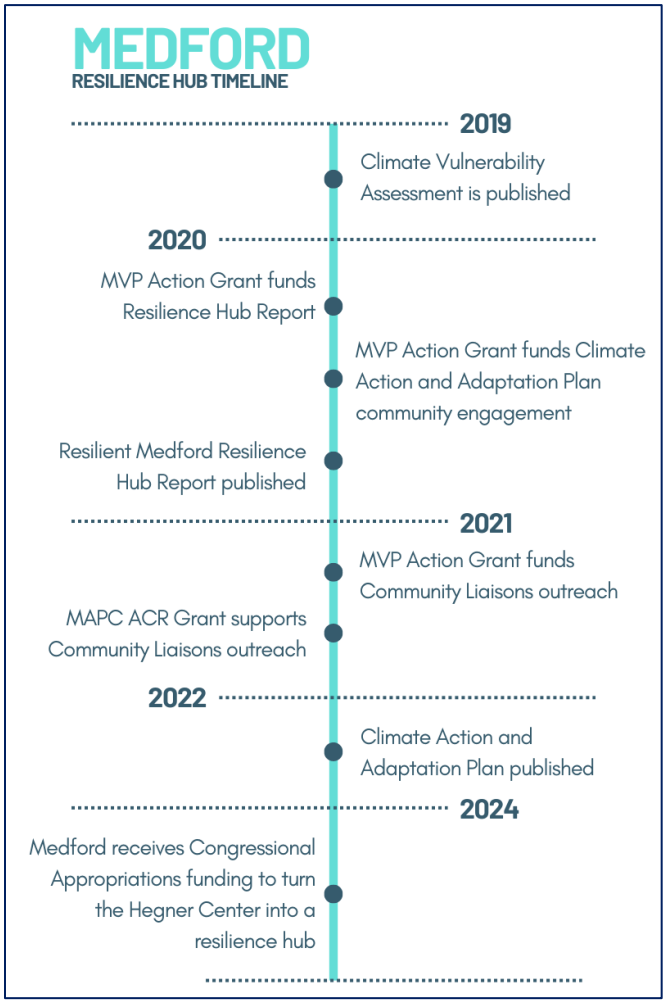

Figure 9: Medford Resilience Hub Timeline (Graphic by Author)

City staff landed on resilience hubs as a strategy to address both public health needs and impending climate impacts after attending a USDN presentation about resilience hubs, around

the same time that Cambridge also started pursuing their own resilience hub. They quickly realized, however, that for a resilience hub project to succeed in Medford, residents and social service providers would need to be on board. The majority of the project so far has thus revolved around extensive community outreach and engagement activities to build trust between residents, CBOs, and city government, envision the kinds of services the resilience hub should provide, and delve into the logistics and partnerships required to run the resilience hub. The resilience hub project has been funded primarily through MVP Action Grants with some additional support from MAPC's ACR grant program. Medford's community engagement for the project is ongoing and the city recently received federal funding to transform the currently vacant Hegner Center building into a resilience hub ("Medford Secures $850K in Federal Funding to Transform Hegner Center into a Municipal Vulnerability Preparedness Site" 2024). Figure 9 shows a general timeline for the resilience hub project to date.

Climate and Resilience Planning in Medford

Medford's 2019 *Climate Vulnerability Assessment* (CCVA) and 2022 *Climate Action and Adaptation Plan* (CAAP) were being written around the same time that the resilience hub project started, and community engagement for each was intertwined. Both plans were further analyzed through the 5 Ws framework to identify the City's broader approach to climate and resilience planning.

Resilience for whom?

Key to understanding how resilience is conceptualized is to understand who decides what is considered resilient and desirable and whose resilience is prioritized. In terms of who's resilience the plans prioritize, both plans mention that climate impacts will affect all of Medford but emphasize that seniors and children, residents whose primary language is not English, people of color, low-income people, people with limited education, and people with disabilities will be disproportionately affected and should therefore be prioritized. The three notable non-

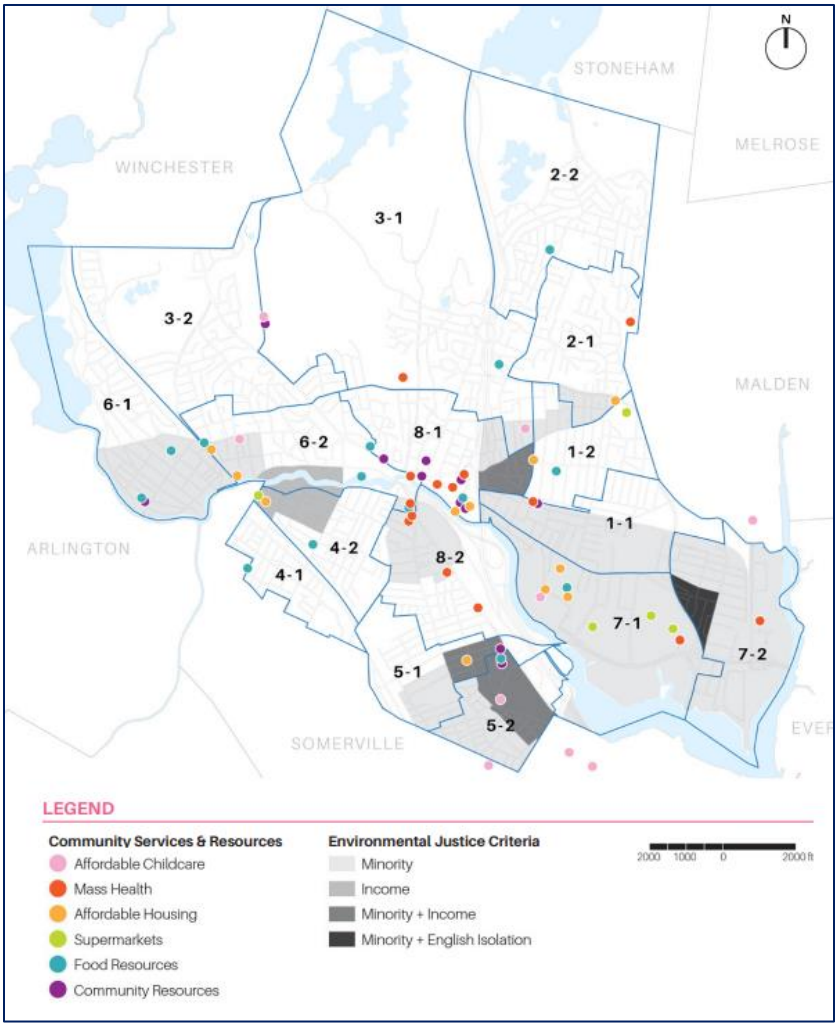

Figure 10: Map showing Environmental Justice Communities and community resources in Medford. (Map by City of Medford. "Resilient Medford: Resilience Hubs" [2020]: 14. Map courtesy of City of Medford.)

English speaking groups in Medford are the Haitian Creole, Brazilian Portuguese, and Spanish speaking populations. The plans also call out that Environmental Justice populations should be given special consideration. The state criteria for environmental justice communities identifies many of Medford's census tracts as Environmental Justice communities, primarily under the minority population, low-income, and English isolation criteria (See figure 10). This is an important distinction that has been carried through into the resilience hub project, which has prioritized outreach to Medford's multilingual residents and residents of color.

In terms of procedural equity and who was involved in deciding what is desirable for the city to be resilient, Medford's CCVA was developed by a team of Medford staff and graduate students from Tufts University using a mix of data from other municipalities and state agencies, and it's unclear if the plan incorporated input from community members. However, it is important to note that the CCVA only identified projected climate impacts and vulnerabilities rather than make normative decisions about what resilience actions the City should take. The CAAP, on the other hand, did include goals, strategies, and actions for making Medford more resilient, all of which

were developed primarily by city staff and key stakeholders, although the city hosted a range of engagement opportunities where residents could share their opinions. Engagement activities included educational and visioning workshops, surveys, working groups, and a community dinner.

Resilient to what?

Similar to the findings at the state scale for Massachusetts, the top three climate impacts identified for Medford are sea level rise and coastal storm surges, increased precipitation events and subsequent flooding, and extreme heat, all of which were identified in the CCVA (Hunt et al. 2019). Sea level rise projections coupled with increased severity of coastal storms indicate that the dam that separates the Mystic River from Boston Harbor could be overtopped by storms as

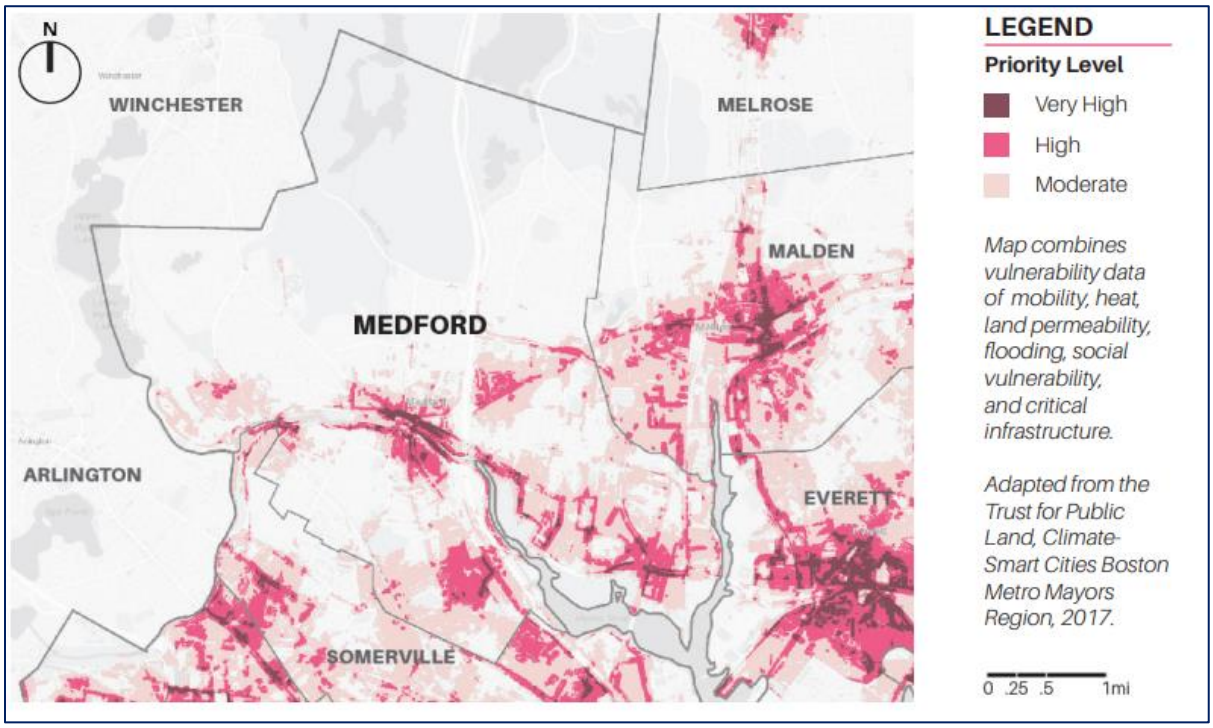

Figure 11: Map showing climate vulnerable areas in Medford based on heat, land permeability, flooding and social vulnerability. (Map by City of Medford. “Resilient Medford: Resilience Hubs” [2020]: 13. Map courtesy of City of Medford.)

soon as 2030, with more severe flooding projected for 2070 (Hunt et al. 2019). Extreme precipitation events (both rain and snow) create additional flooding risk, especially in parts of the

city with poorer stormwater drainage systems (Hunt et al. 2019). Extreme heat days in the summer are projected to become a major health issue for Medford residents, because the number of days over 100º Fahrenheit and with high heat index values is projected to rise dramatically, especially between 2030 and 2070 (Hunt et al. 2019).

While both plans discuss the ways those climate effects will impact infrastructure, they also discuss in detail the ways that climate impacts interact with social vulnerabilities. The CCVA calls out that “patterns of poverty, systemic racism, segregation, gentrification, lack of political representation, weak or nonexistent social networks, and connections” and other factors make some groups more vulnerable to climate impacts than others. Medford’s resilience hub project has been shaped by these needs and others, in addition to projected climate impacts. Thus, the plans go beyond identifying which physical infrastructure should be resilient and grapple with the fact that social and political systems, especially those that more vulnerable groups interact with, need to be resilient to climate impacts as well. It’s important to note that both of these plans by nature suggest and outline future strategies for building climate and community resilience but are not direct actions in and of themselves. Specific programs, like resilience hubs, go beyond these plans and are the site of direct intervention to build resilience.

Resilience for where?

Similar to the way the plans acknowledge that climate impacts will affect some populations more severely than others, they also call out how some neighborhoods in Medford will experience more severe impacts and should therefore be prioritized. The three neighborhoods prioritized because of their more intense climate impacts and characteristics of social vulnerability were South Medford, Wellington and Glenwood.

Resilience for when?

A significant part of the data used for Medford’s CCVA came from the City of Cambridge, since flood modeling that Cambridge conducted for the Mystic River also showed impacts in Medford.

Therefor it's unsurprising that Medford's plans use the same projections scenarios for 2030 and 2070 in their plans. Medford's plans also recognize that climate impacts are already posing challenges for residents and the CAAP's strategies are designed with implementation timelines of 5-10 years.

Resilience Hub Stakeholder Interview and Content Analysis Findings

Community Resilience Related Gaps in Medford's Climate Adaptation Work

Interviewees identified several gaps in climate adaptation and general policy work that the resilience hub project is helping to fill, namely a lack of trust between residents and the city government, a need for more responsive/relationship based and culturally responsive community engagement with residents, residents having to travel outside of Medford to access social service organizations, and siloed working environments within City departments, amongst CBOs and between the City and CBOs.

When starting the resilience hub project, staff understood that for the resilience hub to be a well-used and trusted community space, the broader community would need to be supportive of and feel invested in the idea, which would be a long-term project. One interviewee pointed out that "We knew off the bat that [the resilience hub idea] came out of an internal discussion and internal brainstorm and we had no idea if a) this would resonate with community based organizations that would ultimately form the programming inside the space and b) we had no idea if this resonated with community members, especially historically marginalized community members that we would ultimately want to serve or prioritize in this hub." All three interviewees recognized that part of building community investment in a resilience hub required building a better sense of trust between residents and the City. This reflects guidance from USDN about community member investment in resilience hubs being critical to the eventual success of hubs (Baja 2019). According to interviewees and results in the Resilience Hub report, community input from both the CAAP and initial resilience hub related outreach indicated that residents did

not have a strong sense of trust in the city government or didn't feel that they received enough communication from the city.

Related to this gap in trust, the City was also interested in pursuing more culturally sensitive, linguistically inclusive, and relationship-based community engagement methods through the resilience hub and to some degree the CAAP engagement which was happening simultaneously. As one interviewee mentioned, Medford's Office of Outreach and Prevention had been interested in developing ways to more proactively engage with residents to learn about their needs, rather than waiting until residents came to city hall or reached out to the department. Additionally, from the perspective of both public health and planning staff, some of the City's previous engagement methods were outdated and too 'one-size-fits-all'. There was a need for the city to offer engagement opportunities that were more culturally inclusive of Medford's diverse residents, including through language access initiatives to reach Brazilian Portuguese, Haitian Creole, Arabic, and Spanish speakers.

A more physically and programmatically tangible gap that became apparent during community engagement for the resilience hub project was that residents were unsure about where to access social services and other resources within Medford. All three interviewees discussed how many of the social service organizations that serve Medford residents are based in neighboring cities like Malden, Chelsea, or Somerville. During listening sessions and community outreach, residents expressed dissatisfaction at having to travel far to access social services and other resources. Additionally, there was not necessarily great coordination and communication between CBOs who were likely serving the same resident populations, which ultimately led to the formation of the Medford Connects group, discussed in more detail below.

One final and less emphasized gap that interviewees identified was siloed working relationships between city departments and amongst the network of CBOs serving the community. Medford staff identified that the resilience hub project created a new opportunity to work across

departments. As one interviewee said, “we felt that resilience hubs were a nice way to capture both the everyday community elements that the Office of Prevention and Outreach really wanted to see with the climate resilience element that the [Office of Planning Development and Sustainability] wanted to see.” They mentioned that this kind of collaboration was good practice and necessary for the success of the project, but that it also came with its own growing pains like more administrative and reporting work, which is challenging when municipal staff have limited capacity.

How Medford Identified Community Resilience Needs

Medford’s 2019 CCVA played a key role in shaping how the city thought about climate resilience and the resilience hub project. All three interviewees, in addition to the Resilience hub report, mentioned that data and analysis from the CCVA made clear which parts of the city would see the most severe climate impacts and which populations would be most affected. All three staff interviewed said that this data-driven analysis helped inform which populations and geographic areas should be prioritized for community engagement efforts during resilience hub related outreach. To further this understanding of vulnerability and resilience, the Resilience Hub report also mapped community resources like affordable childcare, grocery stores and other food resources, and affordable housing sites overlayed with state Environmental Justice population criteria to further inform which neighborhoods would be the strongest candidates for a resilience hub location. Two interviewees discussed that this analysis of access to resources has been supplemented by data from an intake form used by the City’s social worker, about what kinds of services residents are trying to access when they interact with the City.

Climate and social vulnerability data may have provided a foundation for understanding resilience needs, but Medford’s community engagement activities played a more important role in the resilience hub project. Community outreach engaged with two primary groups: community-based organizations who provide social services to vulnerable populations and

residents themselves. Initial outreach to CBOs consisted of interviews with organizational staff to understand how they were thinking about climate change and emergency preparedness internally, in addition to gauging their interest in the resilience hub concept. Before the resilience hub project, there had been an informally connected network of service providers in Medford, but with grant funding from MVP the City formalized the network into Medford Connects[1], a subset of those CBOs who are invested in the resilience hub project and are actively participating in conceptualizing and designing programming for the hub.

Throughout the development of the CAAP and ongoing work for the resilience hub, Medford residents have been engaged in a variety of ways. Engagement activities for the CAAP were widespread and while it's likely that findings from most of those activities had some influence in how staff understood and approached community resilience needs, interviewees specifically mentioned mobile outreach and Community Dinners as activities that simultaneously informed the resilience hub project. City staff conducted mobile outreach at community events and public spaces to educate and engage with residents, and a community dinner for Haitian Creole speaking residents was hosted in fall 2020. For the community dinner, staff received support from the Medford Family Network, who suggested the community dinner format, the time and length of the event, and helped provide translation between English and Haitian Creole, all to make the event feel more accessible and welcoming to Haitian residents. The City intended to host community dinners for other community groups, but the efforts were interrupted by complications from the COVID-19 pandemic. At each of these engagement events, residents were asked about their experiences with climate impacts, where they might go in case of an emergency, and what they would like to see for Medford to be a stronger, healthier community, often using maps of climate impacts to prompt discussion. The information gathered from these

[1] Medford Connects Website: https://www.medfordma.org/departments/health-department/medfordconnects

events identified that residents felt unsure about where to access resources during a climate disruption, and that there was more need for linguistically inclusive engagement, which ultimately helped shape additional resilience hub engagement activities like the community liaison program.

The centerpiece of the resilience hub's community engagement strategy has been the Community Liaisons program[2], funded through MVP and ACR grants, which hired Medford community members to build trust with residents and through those relationships, gather information about community needs. Community Liaisons were hired to represent Spanish, Brazilian Portuguese, Arabic, and Haitian Creole community members, in addition to liaisons to represent Medford's Black and Asian communities. Liaison positions were designed for Medford residents who were already well connected to their respective communities and could cultivate stronger relationships, establish trust and gather community concerns and ideas over time.

As one interviewee pointed out, liaisons did not have pre-defined outreach plans, rather they have carried out myriad engagement activities based on personal knowledge and connections of their communities. Liaisons interact with residents in less formal and more intentionally fun ways than typical public meeting or outreach tabling sessions. They have one-on-one conversations, have hosted regular conversation groups and dinners, and others have even directly helped residents access resources like MassHealth and SNAP/WIC. Through these interactions and building or strengthening relationships with residents, liaisons collect information and insight into resident needs that could be served by the resilience hub or other city programs.

How Community Input Has Influenced Medford's Resilience Hub

[2] Community Liaisons Website: https://www.medfordma.org/departments/health-department/community-liaisons

Community input from residents has influenced and informed a variety of aspects of resilience hub planning including building trust with residents and gathering programming ideas. All three interviewees said that information about community needs that community liaisons communicated to city staff has been the primary source of data for understanding community member needs and what kind of programming they would like to see in the resilience hub.

Of the actual information about community needs and resilience hub programming ideas gathered from Medford residents, the majority focused on the ways that resilience hubs could serve community needs on an everyday basis. One interviewee discussed how the community engagement approach was "to focus on the framework of climate resilience without saying climate resilience because I think that often turns people off, so instead I said fostering social networks and social connection, supporting community belonging, supporting access to information…and access to resources." Interviewees indicated that, when thinking about everyday needs, residents identified that resilience hubs should have community programming and education for all age groups, should serve as a central point for getting information about social services and other resources available to residents, should support language inclusivity for multi-lingual residents and even potentially have a community-run café space where people could meet, connect, and build relationships with each other. These ideas primarily focus on designing programming for the resilience hub, although some of the communication and resource access ideas relate to the administrative and operational needs of a resilience hub.

In contrast to resident engagement which was characterized by building trust and identifying programming ideas, interviewees characterized outreach and engagement work with CBOs as revolving around formalizing and strengthening relationships between CBOs and planning the operations and administration of a resilience hub space. CBOs in the Medford Connects group have been working through what it would mean to have co-located office space in a resilience hub and facilitate access to resources for residents. All three interviewees mentioned that

organizations in the Medford Connects group now think of the future resilience hub as a satellite office for their organizations. As detailed by interviewees and the Resilience Hub report, engagement with CBOs had also revolved around developing better communication systems and partnership between organizations so that they can get information to residents more effectively and have a better system for referring residents between organizations. Those capacities are already being built by current conversations, but the goal is for the resilience hub to be a physical space that further facilitates them.

Interviewees acknowledged that emergency preparedness and services for times of climate disruption have not been a strong focus of community engagement activities so far. Some outreach activities for the CAAP asked residents about what locations or organizations they might go to in the event of severe climate impacts. Additionally, CBO staff were interviewed during the development of the *Resilience Hubs* report, during which they were asked about awareness of and preparedness for climate disruptions. One interviewee said that the general takeaway from those interviews was that CBOs were not thinking about climate impacts in terms of their own operations, although they did recognize that climate change might have disproportionate impacts on the populations they served. Community engagement for the resilience hub project is ongoing, and two interviewees mentioned that the next round of funding, will allow the focus of engagement with residents to shift more towards emergency preparedness and disruption-related ideas.

Conclusions and Key Themes

Medford's resilience hub project came about because of complimentary goals from the Health Department, to improve communication with residents and access to social services, and the Office of Planning Development and Sustainability to improve climate resilience in the city. The 2019 CCVA provided a technical data background on climate impacts and vulnerable populations that climate initiatives should focus on, and engagement carried out for the CAAP

has also been influential. Two of the main gaps that the resilience hub project aims to fill are the limited ability of Medford's municipal government to provide resources for community needs and dispersed physical locations to access social services in the city. To address these gaps, community engagement for the project has revolved around consistent, culturally relevant, and accessible opportunities for residents to share ideas and express concerns. Additionally, engagement with CBOs has centered on building better working relationships between organizations and planning for the administrative and operational needs of the resilience hub.

Medford's resilience hub project offers an example of building a resilience hub in the absence of existing strong, inclusive, and trusted community spaces. This context has required the project to focus on relationship building and how to serve residents' everyday needs, before thinking about the physical location of a hub or programming for climate disruption needs.

Chapter Summary

This chapter has outlined the main findings from case study content analysis and interviews related to gaps in climate resilience planning that resilience hubs aim to fill, methods through which community input was collected, and how that community input was woven into resilience hub development. Cambridge and Medford have similar climate and resilience planning documents that laid the groundwork for their resilience hub projects, but each took different approaches to resilience hub implementation. Cambridge is working on a resilience hub pilot with CCC, a trusted community space, where the focus has been on planning for energy resilience building upgrades. Medford's project, on the other hand, has focused on community engagement with residents and CBOs to build trust and community support for the resilience hub. The following chapter will analyze these case studies in relation to each other, academic literature about community resilience, and frameworks for resilience hub development.

Chapter 5: Analysis and Discussion

This chapter analyses the results from the case studies about Cambridge and Medford's resilience hub projects using insights drawn from the USDN framework for developing resilience hubs, as well as concepts about climate action planning, resilience theory and community engagement from the literature review. The discussion mainly focuses on how climate adaptation planning and resilience hub development are intertwined, the role that social capital plays in resilience hub development, and how community decision-making and influence is incorporated into resilience hub planning processes. Insights drawn from this analysis guide the recommendations made in the final chapter of the thesis.

Connections between Climate Resilience Planning and Resilience Hub Development

Academic literature identifies a suite of gaps or limitations within municipal climate plans, including limited focus on actions to improve community and social resilience, limited information about whether and how community engagement influenced proposed actions, and an over-emphasis on quantitative data to evaluate climate impacts, among other things (Lambrou and Loukaitou-Sideris 2022; Stults and Woodruff 2017). Many of these shortfalls may come about because planning for urban resilience inherently involves tradeoffs about who's resilience is prioritized, what impacts are considered, and in which parts of the urban area is resilience most needed (Meerow and Newell 2019). At the same time, resilience hubs are framed as local and place-based projects that directly improve community resilience for under-resourced and historically disinvested populations through active co-creation and co-management of facilities, addressing distributional inequities in access to resources and building social capital (Baja 2022). At face value, that might suggest that resilience hubs are a solution that fixes the limitations of other resilience planning efforts, but the research results from this thesis suggest a more nuanced relationship between the two.

The Medford and Cambridge case studies demonstrate a relationship where climate planning documents provide the justification and foundational data to inform the development of resilience hubs, indicating that broader climate action planning was a necessary first step to progress each resilience hub project. The vulnerability assessments and climate action plans from both cities included significant recognition of unequal distribution and severity of climate impacts, especially as influenced by characteristics of social vulnerability, which is not typical of hazard mitigation planning, but is commonly found in climate action plans (Lambrou and Loukaitou-Sideris 2022; Frazier et al. 2013). Across both case studies, interviewees recognized that data from each city's climate action planning documents provided justification for why interventions like resilience hubs were important and helped focus the resilience hub projects in terms of geographic scope and the specific populations to engage with. This process is consistent with UDSN resilience hub guidance which advises looking to data from local plans like vulnerability assessments and hazard mitigation plans, among others, to inform the vulnerabilities that hubs should address (Baja 2019).

This research supports the idea that resilience hub planning is facilitated by the groundwork laid during climate action planning. Cambridge Community Center's executive director went so far as to say that CCC would likely never have considered becoming a resilience hub without prompting from the City, who felt a resilience hub would help address needs that climate vulnerability assessment data made clear. This relationship between previous climate plans and resilience hubs presents a potentially more optimistic outlook than some research which suggests that there is often little connection between the climate impacts identified and proposed actions within climate action plans (Stults and Woodruff 2017). In fact, both case studies explored for this research indicate the opposite; the vulnerabilities identified in Cambridge and Medford climate action plans directly influenced the placement of resilience hubs.

Interestingly, while literature on this topic often includes hazard mitigation planning and disaster risk reduction as key parts of resilience and adaptation planning practices, these topics were not mentioned almost at all in interviews in either case study, and therefore hazard mitigation plans were left out of the content analysis. This was also a surprising finding, since the USDN framework for resilience hubs also calls for referencing local HMPs (Baja 2019). Hazard mitigation plans have often been critiqued for their limited incorporation of community engagement and almost exclusive focus on physical rather than social vulnerability, as well as their reliance on historical data to inform risk rather than future climate projections (Frazier et al. 2013; Highfield, Peacock, and Van Zandt 2014). The only interviewee who mentioned hazard mitigation plans said “We have all these [hazard mitigation and emergency management] plans, but the thought was does the community even know what they are and what to do in an emergency?...The Comprehensive Emergency Management Plan is 200 pages, no one’s going to read that.” While resilience hubs have an innate focus on helping residents to weather and recover from climate disruptions, which is adjacent to the focus of municipal HMPs, based on this research, HMPs do not play a significant role in informing resilience hub development the way that climate vulnerability assessments and climate action plans do. This may support literature that calls for hazard mitigation planning to be more participatory and to include more focus on how social vulnerabilities interact with risk and exposure to hazards. Resilience hub planning might also be improved through more connection to hazard mitigation plans, since research has suggested that coordination between HMPs and climate action plans is beneficial for resilience efforts (Matos et al. 2023).

In addition to highlighting siloing between hazard mitigation and climate action planning, resilience hub projects also offer an opportunity to address the general siloing of work between municipal governments. This was made especially clear in Medford, where interviewees talked about how the resilience hub project created an opportunity for collaboration across municipal

departments like the Department of Health and Department of Planning, Development and Sustainability because it brought together climate and public health related goals. Literature confirms that fostering a community's resilience to climate change inherently requires knowledge, skills, and resources from many different disciplines that can be spread across multiple municipal departments (Meerow and Newell 2019). However, getting those disparate departments to work together can be challenging. As one interviewee said of working across departments in Medford "municipalities aren't really designed for that level of collaboration. People like to stick to their lanes. We still run into those separations between disciplines and knowledge." Working across disciplines and areas of expertise is critical for resilience work, because it can help identify gaps or blind spots that are only made visible when working collaboratively to understand the complex socio-ecological systems that affect resilience (Meerow and Newell 2019). While the resilience hub project has facilitated more collaboration between departments in Medford, there is still room for better coordination across departments and especially across municipal plans, like incorporating more features of emergency preparedness from hazard mitigation planning, which will be the focus of Medford's next phase of community engagement.

Resilience hubs may also benefit from collaboration and information sharing across municipalities. Although interviewees in either case study did not say that their resilience hubs were directly influenced by each other, Cambridge and Medford are neighboring municipalities and may have been influenced by each other's practices, especially since both were inspired to start resilience hubs around the same time based on outreach and materials from USDN. At the very least, they already have relationships through which to share climate related data, as Medford used Cambridge's flood modeling to inform their CCVA. More collaboration is likely facilitated by networks like USDN's Resilience Hub Community of Practice, open to USDN member organizations promoting resilience hubs in their communities ("Get Involved" 2019).

Social Capital, Community Resilience and Resilience Hub Planning

Several kinds of social capital are recognized in the literature as being crucial parts of community resilience because social capital connects people to each other, to organizations and resources in their communities, and to power structures and decision-making (Aldrich and Meyer 2015). Published work on resilience hubs, including guidance, documents, and frameworks, recognize that hubs can also be a site where people build or improve upon their social capital, because they offer space where people can interact with each other and access resources for everyday, disruption, and recovery needs (Baja 2022; 2019). While the two case studies in this thesis add to those findings through ideas for everyday programming collected from residents, they also show how social capital plays a crucial role in the *process* of developing and implementing resilience hubs, not just as a benefit accrued after a resilience hub is put into action. Resilience hub projects in Cambridge and Medford relied on different kinds of social capital and community relationships to build support for the idea of resilience hubs and to gather information about community needs and programming ideas. Bridging social capital, or the connections people have to community groups and organizations, and linking social capital, or the connections people have to institutions like their local government, both played an important role in both case studies (Aldrich and Meyer 2015). However, each city approached social capital in slightly different ways.

In Medford, one of the largest gaps that resilience hubs are trying to address is a sense that residents do not know where to access resources for their everyday needs or during disasters. That gap exists in part because social service organizations that residents need to access are often located in adjacent municipalities, not in Medford, and because residents did not feel like there were good systems of communication with the city government. This can be seen as a lack of bridging social capital which connects residents to each other and community groups or organizations in their neighborhood (Aldrich and Meyer 2015). The everyday programming

ideas that residents brainstormed for the resilience hub, like youth programming, a community café, and a central location to access social services, would no doubt create spaces where bonding social capital between residents and bridging social capital between residents and CBOs could be generated, exactly as outlined in resilience hub guidance (Baja 2019).

Additionally, the community engagement processes that the city is using to lay the groundwork for their resilience hub are in and of themselves designed to foster bridging and linking social capital. For example, the work of Medford's community liaisons aims to build connections amongst residence of different language and ethnic groups, a form of bridging social capital, as well as building better pathways for resident ideas and concerns to be heard and addressed by city officials, a form of linking social capital. Because liaisons are members of their communities and several are multilingual (Spanish, Arabic, Haitian Creole, and Portuguese), they are ideally able to communicate more effectively and build trusting relationships with residents. Research shows that non-linguistically inclusive climate communications, like English-only communications and the over use of jargon-heavy language, can reinforce oppressive power structures that compound climate inequities (Fine 2022). Using practices like multi-lingual communication and translation, avoiding jargon, and centering community participation are all practices shown to make climate work more inclusive, build agency within frontline communities and foster more trusting and cooperative relationships (Fine 2022). The relationships that community liaisons already had or have built over time with their respective language or racial/ethnic groups have been avenues for gathering input on resident needs and desires that have directly influenced the development of the resilience hub. Cambridge is also employing multi-lingual outreach through their Neighborhood Energy program, in an effort to better reach their target populations and CCC recognized that they have room for improvement when it comes to language inclusivity. Because this research did not include interviews or other data from the community liaisons or residents themselves, no claims can be made as to how

successful these efforts have been at actually creating those forms of social capital, but the fact that the City has set up these structures is a step in the direction of improving the overall community resilience of Medford's multilingual and racially diverse residents.

The other part of Medford's resilience hub community engagement, building a formal network of community-based organizations and social service providers through the Medford Connects program, is a strong example of social capital as "features of social organizations, such as networks, norms, and trust that facilitate action and cooperation for mutual benefit" (Aldrich and Meyer 2015, p. 257). Through this network of CBOs, the City has built mutual understanding about resilience hubs, and how CBO's could co-locate satellite offices within a resilience hub space, which would benefit the growth of social capital once the resilience hub is established, but in the meantime has also improved communication and coordination between CBOs for meeting resident needs in the present. A network of organizations that can collaborate and coordinate together help provide a complete set of accessible services and resources to residents for everyday needs and in the event of a disruption, furthering the community's adaptive capacity and resilience (Norris et al. 2008). Thus, the process of developing Medford's resilience hub has begun to improve social capital amongst CBOs in the city and their relationships with residents, even before the physical resilience hub space has been established.

Social capital played an equally important role in developing the Cambridge Community Center as a resilience hub, although more so because of existing social capital as compared to Medford's efforts to build social capital where it wasn't strong. One of the development strategies that USDN suggests is to establish resilience hubs in community spaces that residents already trust, i.e. where bridging social capital already exists (Baja 2019; Aldrich and Meyer 2015). This is the approach that the City of Cambridge took when identifying CCC as a pilot resilience hub site. Over its 90-year history, CCC has built up a reputation as a trusted

community space with a culture of community-responsive programming. CCC is a strong example of a bridging CBO that can “play a critical role in procuring new climate protective resources for vulnerable neighborhoods” (Shokry et al. 2022, p. 236). Furthermore, CCC has established relationships that facilitate the inclusion of resident perspectives and community-identified needs into the resilience hub project, which is a benefit to the community’s overall resilience (McDonnell et al. 2019). The main way that information about community needs is gathered at CCC is through informal conversations between staff and residents, which can be characterized as bridging social capital both because there is a sense of trust and community between residents and staff to share information, and because staff and the Center as an organization are in a position to provide programming and resource support based on identified needs.

This existing base of social capital within CCC made it an ideal choice as a pilot resilience hub site because the center already had a strong understanding of community needs and could therefore move quickly onto the phase of planning energy resilience and other building improvements. Similar to Medford, relationships based on social capital played a crucial role in the development of Cambridge’s resilience hub because they were the main avenue through which community needs were identified. CCC’s relationships and trust with community members have influenced the City’s approach to the Neighborhood Energy program, where they are trying to identify other trusted community sites where bridging capital already exists, as possible locations for microgrid and resilience hub-style resources.

These examples of improved relationships and avenues of collaboration, coupled with coordination of resources for everyday and disruption times, indicate how resilience hub planning is improving adaptive capacity in Cambridge and Medford. Literature on resilience hubs indicates that they can increase “the community’s adaptive capacity through proactive communications and relationship building” (Baja 2022, 101). Organizations that provide

community health, food access, housing stability, and other social and environmental support are critical parts of adaptive capacity that serve socially vulnerable residents (Shokry et al. 2022). The improved relationships between the City of Cambridge and CCC staff, between community liaisons and residents, and between CBOs in the Medford Connects group and the City of Medford, are all necessary for the successful implementation of resilience hub projects. But beyond that, those improved relationships facilitate efficient communication and collaboration that is useful for responding to residents' everyday needs and responding quickly to changing conditions during climate disruptions. These 'adaptive capacities' are systems and relationships that can be linked together to build the community's overall resilience (Norris et al. 2008).

One caveat to this discussion is that while social capital can positively contribute to community resilience, there are ways in which social capital can reinforce homogeneous groups and be an insulating force, therefore diminishing community resilience (MacGillivray 2018). This concept was touched on in Cambridge interviews, as staff recognized that the Cambridge Community Center did not have the physical capacity to serve all community members, and city staff noted that, in reaching out to other CBOs through Neighborhood Energy, not all community members will feel comfortable accessing resources at certain CBOs, especially faith-based organizations.

One of the foundational elements of any kind of social capital is trust between people or organizations, which was a resilience-related gap identified in both case studies. Interviewees indicated that residents did not have a strong sense of trust with municipal government and didn't necessarily think to turn municipal government in times of need. That lack of trust and familiarity is likely connected to governments' increasing reliance on CBOs to provide social services to residents, displacement pressures on low income and residents of color after climate-related improvements to their neighborhoods, and a general sense of distrust in government from communities who have historically not been prioritized or included in

government decision-making about housing, zoning, urban renewal, and a host of other policies (Shokry et al. 2022; Einstein, Palmer, and Glick 2019). Resilience hubs are designed to bridge those gaps, as USDN have emphasized that they should be “co-developed and co-managed by members of the community/community-based organizations” in order to be trusted community spaces that people feel comfortable turning to during climate disruptions (Baja 2019, p. 20). While Cambridge could rely on well-established community centers like CCC as an intermediary with strong, trusting relationships with community members, Medford didn’t have a CBO with relationships like that in the neighborhoods with most severe climate impacts. Thus Medford, building off staff’s understanding that previous community engagement methods were not very equitable or culturally sensitive, structured community engagement for the resilience hub in ways that would invite longer-term and more trusting relationships between the city and its residents. This research did not go so far as to evaluate how well these engagement activities have actually built trust, but suffice to say that the City recognized that trust building as a key first step to ensure the resilience hubs success.

Local Knowledge and Community Decision-Making in Resilience Hub Development

Academic literature highlights that climate action and resilience planning benefit from the inclusion of qualitative data from community engagement activities that capture local knowledge about climate impacts and the complex interactions that happen between social and ecological systems that affect resilience (Tariq, Pathirage, and Fernando 2021). While quantitative data from climate vulnerability assessments provided a foundation for resilience hub work, both case studies showed that resilience hubs were additionally informed by input from residents of linguistically and ethnically diverse backgrounds, and therefore developed a more nuanced understanding of the community needs that could be served through the resilience hub.

In both case studies, the resilience hub projects used different and likely more equitable and accessible forms of community engagement than the Climate Action Plans for each city. Climate action planning in each case relied more heavily on engagement methods that informed, consulted and involved residents, such as public meetings, focus groups, surveys, and committees (Gonzalez 2020). These types of activities aim to provide the community with information, gather input and incorporate community needs into planning processes, which are all important steps, but don't necessarily achieve deeper collaboration with community members (Gonzalez 2020). While these community engagement formats can be conducted in ways that are more accessible and inclusive such as providing childcare or language interpretation, research shows that the participants in public meetings and other 'traditional' engagement methods are often the wealthier and more educated within a given community (Einstein, Palmer, and Glick 2019; McDonnell et al. 2019). In contrast, the resilience hub projects used less traditional forms of community engagement, such as Medford's community liaison program and relationships between staff and residents at the Cambridge Community Center. These non-traditional engagement methods are fitting for resilience hub projects because they aim to engage with populations who are more socially vulnerable to climate impacts and are typically the least represented in traditional engagement activities (Einstein, Palmer, and Glick 2019).

Other literature on climate and resilience planning indicates that, while it is common for climate action plans to include a variety of community engagement activities, plans are often unclear about exactly how public input is incorporated into the plan and how it may have affected decisions about what strategies were prioritized (Lambrou and Loukaitou-Sideris 2022). Case study analysis in this research agreed with this trend, since plans from both cities listed community engagement activities, but were not always explicit about how input gathered from those activities was incorporated into each plan. In the Community Engagement to Ownership (CE2O) framework, community engagement activities can be categorized based on to what

extent they shift power and decision-making to community members (Gonzalez 2020). The CE2O framework arranges community engagement activities on a spectrum, ranging from simply informing residents, to more active incorporation of community identified needs into plans, through to deferring to community ownership and leadership (Gonzalez 2020).

Resilience hubs are described as spaces that should be “co-produced and co-managed” by community members or organizations through a core organizing group (Baja 2019). This description falls into the ‘collaborate’ category of the CE2O framework, where solutions are “co-designed and co-implemented” through collaborative decision-making, citizen advisory committees, and memorandums of understanding with CBOs (Gonzalez 2020). Given that both Cambridge and Medford’s resilience hubs were inspired by the USDN framework, their approaches to community engagement for resilience hubs generally encouraged deeper participation than engagement for their climate action plans. The case studies in the thesis show a range of community engagement activities, some of which involve more active collaboration and community decision-making than others.

In Medford’s community engagement activities, residents were consulted, via community liaisons and some CAAP outreach, about what needs they had, how a resilience hub might be able to meet those needs, and what kind of programming they would want to see within the resilience hub. While these activities certainly give residents agency in identifying what resources they want provided, which is a form of consultation in the CE2O framework, it’s harder to determine how much decision-making power is shifted from municipal staff to residents, because these ideas were collected during a more exploratory part of the resilience hub process. However, all three interviewees commented that input on needs and programming would directly influence the resilience hub because it would need to be a community centered space to be successful, a sentiment which aligns more with the ‘collaborate’ category of the CE2O framework, where community members “play a leadership role in decision-making”

(Gonzalez 2020, p. 2). More insight might be gained once the resilience hub project is at a phase where specific programming decisions are being made. CBOs in the Medford Connects network could be characterized within the ‘collaborate’ category of the CE2O framework, since discussions within the network have revolved around how CBOs will help manage and operate the resilience hub, indicating a level of practical decision-making within that group.

One aspect of Medford’s community engagement strategy that straddles multiple categories in the CE2O framework is the idea of building trust between residents and the municipal government. Trust can be a beneficial byproduct of engagement activities in the ‘involve’ category, where city staff gather community input and participation from the beginning of a project (Gonzalez 2020). Furthermore, multiple categories in the framework reference the need for trusted community leaders to whom power can be delegated, since they can be considered representatives of the wider community (Gonzalez 2020). The community liaisons play an interesting and potentially dichotomous role in trust building. They are both specifically chosen because they belong to and have connections within marginalized communities in Medford, which points to their position as possible community leaders, while also being employed by the city, which could potentially be viewed as a conflict of interest should tensions arise. Because most community input for the resilience project is being collected through community liaisons, they are well positioned to play a role as community representatives in resilience hub decision-making. While interviewees discussed that, from the City’s perspective, community liaisons play a critical role in community engagement, understanding to what extent community liaisons can truly act as community leaders depends on how they are viewed by community members, since liaisons were ultimately chosen by the city, rather than designated by community members themselves. Understanding the complexities of that dynamic would better illuminate to what extent the community liaison program is building trust around the resilience hub project. Regardless, the community liaison program is an improvement over engagement activities that

simply inform or consult residents, as an example of collaborative engagement that both "requires and makes possible more trusting relationships and the healing of old divides within systems that tend to be more transactional" (Gonzalez 2020, p. 7).

The CCC case study is more complicated to evaluate. When viewed from a high-level, the City of Cambridge's approach inhabits characteristics of collaborative engagement, because they have partnered with CCC by provided technical assistance and have been a conduit for funding, but Cambridge Community Center staff maintain decision making power over the resilience hub project. Those characteristics are examples of delegating power to community leaders and bringing together different strengths and capacities needed to enact effective solutions, which fall under collaborative engagement in the CE2O framework (Gonzalez 2020). The City partnered with CCC precisely because CCC has better knowledge of and capacity to serve the needs of community members than the city itself does.

However, the engagement between CCC staff and their community members is harder to characterize. At face value these conversations seem more like informing and consultation, where residents are given information about the resilience hub and asked what needs they have. But these interactions are not that simplistic, as interview findings described how staff and residents have strong trusting relationships and staff maintain a commitment to be responsive to community needs, which are characteristics of more involved engagement that starts to shift direct influence to community members (Gonzalez 2020). Therefore, these interactions might include more agency or power for residents because they know that staff take them seriously and will respond accordingly, rather than coming from a place of placation. Ultimately, the informality of these interactions makes it harder to tease out the power-dynamics at play and the mechanisms through which community member needs are translated into programming or services. While delving into the intricacies of these trust and power-dynamics is beyond the

scope of this thesis, they are important factors to keep in mind especially as Cambridge identifies other 'trusted' community spaces to be developed into resilience hubs.

This analysis of resident decision-making power in resilience hub development comes with the caveat that in order to truly understand the level of citizen control in these projects, additional research is needed that investigates development of resilient hubs from the perspective of residents involved in the process. Interviewees for this research were all municipal employees, contracted consultants, and CBO staff; therefore this analysis does not include the direct perspectives of people like community liaisons or community members who frequent CCC. This is a limitation that will be explored further in the recommendations and conclusions chapter.

Climate Framing and Resilience Hub Community Engagement

A tangential finding on the topic of community engagement is that, when reaching out to residents about the resilience hub projects, both cities avoided talking about the projects in direct relation to projected climate impacts. Instead, they framed the projects in a way that primarily focused on the day-to-day needs and services that residents wanted addressed, in line with the first part of USDN's characterization of resilience hub functions: everyday services. Interviewees from both cities talked about how residents from their target populations might not resonate with climate change framing and that it was easier to gather information about community needs by talking about systems like food access, housing, and transportation, rather than flooding or extreme storms. This may seem counterintuitive to practitioners who approach resilience hubs as climate resilience initiatives, but interviewees indicated that this framing was a more effective way to engage with residents from socially vulnerable populations.

Some of these tensions are related to the phenomenon of "green gentrification", where government investments in climate adaptation and resilience like green infrastructure or expansion of urban greenspace are connected to the displacement of lower income and communities of color as those "green" interventions make urban spaces more desirable to more

affluent citizens and business interests, sparking gentrification (Shokry et al. 2022). As one Cambridge interviewee discussed, framing the resilience hub as a climate initiative made residents wary of the project, because they worried that a ‘climate change project’ would negatively affect how CCC was able to support them, based on their previous experiences with climate-related programming. Literature suggests that ‘green gentrification’ trends are more strongly related to approaches that frame any climate adaptation project as “inherently good for all” rather than dealing with the complex equity implications of those projects (Shokry et al. 2022, 214). It is somewhat wishful thinking that any climate or resilience project is a win-win for everyone. Resilience related decisions and projects inherently involve tradeoffs and dealing with the complexity of those tradeoffs is important for addressing the ways that resilience projects can perpetuate inequities (Meerow and Newell 2019). Resilience hubs are designed to address climate inequities and the systems that perpetuate them, ideally setting them up to avoid furthering green gentrification, but municipalities or CBOs developing resilience hubs may have to grapple with concerns about displacement from residents’ resilience hubs are supposed to serve.

Focusing community engagement on ‘everyday’ services and other programs not explicitly linked to climate change was an effective method for introducing the concept of resilience hubs to community members in both case studies, potentially sidestepping concerns about displacement. Interviewees from both cities mentioned that they had received little to no opposition to resilience hubs, indicating that this approach has had success. However, a central goal of resilience hubs is to building resilience to climate disruptions (Baja 2019). Being able to tie climate impacts into conversations about housing, transportation, food access, etc. is an important part of that resilience building. This focus on climate impacts may become more apparent in later stages of each resilience hub as they shift focus to emergency preparedness and ‘disruption’ services in the future.

Limitations

As mentioned in the analysis, one of the main limitations of this research is that interviews were only conducted with municipal staff and one CBO staff person, not with any residents, community liaisons or other community members involved in the resilience hub projects. This limitation was primarily due to limits on time and capacity of the researcher. While the findings from interviews shed light on resilience hub development and its connections to building trust and relationships through social capital, these findings are only based on the people on one side of those relationships. To better understand the depth of trust building, the extent of social capital development, and the overall success of creating community buy in for resilience hubs, it is necessary to hear from community members themselves about their experiences with the resilience hub projects.

Staff turnover in the City of Cambridge also presented a minor challenge to this research. While all three interviewees from Medford were directly involved in their resilience hub project, the City of Cambridge has experienced staff turnover in the planning position that directly coordinates with CCC on the resilience hub project. The staff planners interviewed from Cambridge are currently involved in the resilience hub project and provided sufficient information and insight into the project for this research, but additional insight could be gained from interviewing the planners who worked with the City prior to and during the initial stages of the resilience hub.

Conclusion

Resilience hubs in Medford and Cambridge have benefited from a foundation of climate data included in each city's climate vulnerability assessments and climate adaptation plans and have deepened the work of those plans by collecting more targeted qualitative information directly from residents and CBOs about community needs. Social capital, from existing relationships and new relationships fostered through community engagement, has played a critical role in enabling the collection of information and ideas from residents. Additionally, the different

community engagement tactics used in each resilience hub have provided more agency and decision-making power to community organizations and residents to varying degrees. The following chapter will discuss overall conclusions and lessons learned from these case studies and propose recommendations for other practitioners considering resilience hubs for their communities.

Chapter 6: Conclusions and Recommendations

This thesis set out to investigate how resilience hubs were being developed in Cambridge and Medford by understanding what gaps in existing climate resilience planning resilience hubs could fill, how community resilience needs were being identified, and how input from community members was influencing resilience hub development.

Key Takeaways

State and Local Context for Resilience Hubs

State and local climate adaptation and resilience planning and grant programs have provided an enabling environment for resilience hub development by setting goals for and directing funding towards serving populations who are most impacted by climate change. Programs like the state's MVP Action Grants, MAPC's ACR Grants, and other resilience-focused funding sources have made resilience hub projects possible in Cambridge and Medford. The USDN's Resilience Hub framework was also the source of inspiration for both projects and has helped shape their development.

Despite research indicating that local level climate adaptation plans lack specificity in their projected climate impacts and proposed actions, both case studies indicated that municipal climate change vulnerability assessments and climate action plans were a critical first step in resilience hub planning. The broad data on projected climate impacts and socially vulnerable populations collected in those plans helped narrow the geographic scope of each resilience hub and identify which resident populations should be served by the hubs. However, resilience hubs went further than climate action plans in centering community-identified needs and more participatory engagement methods, likely because resilience hubs have a more narrow geographic and demographic scope, and because USDN guidance stresses the importance of centering co-developing hubs with community members.

Gaps that Resilience Hubs Fill

Beyond addressing broad goals to support populations most affected by the unequal impacts of climate change, resilience hubs in both Cambridge and Medford aimed to improve access to resilience-building resources through more trusting relationships. Both cases identified that residents lacked a certain level of trust with the city government and wouldn't think to go to government in times of disruption. Medford's approach to this issue, in the absence of well trusted community organizations or spaces, was to engage in a long-term community engagement process with CBOs and residents to build trust and better communication channels. The City of Cambridge, on the other hand, chose the approach of relying on existing trusted community spaces like the Cambridge Community Center as resilience hub locations.

The resilience hubs also aimed to fill a host of other gaps. In Medford, the resilience hub is being designed as a central hub for accessing social services, because residents did not like having to travel to other municipalities to access those services. Cambridge's primary focus throughout the project has been on energy resilience improvements to their building that will help the center run more efficiently everyday and equip them to serve residents during disruptions. While these gaps are different, the process of addressing them has improved adaptive capacity in each city by facilitating better connections between CBOs and municipal government and better preparing CBOs to serve changing community needs.

Identifying Community Needs

While data from climate action plans set the stage for resilience hub planning, Cambridge and Medford both relied on less traditional forms of community engagement to identify specific community needs to be served through resilience hubs. These activities included Medford's community liaisons program, the Medford Connects program, and the use of CCC staff's relationships with their community members, which were the primary methods through which each project gathered information from residents about their needs. Both approaches are a departure from more 'traditional' engagement methods like public meetings, survey and focus

groups, which are not always good at engaging with marginalized communities. These engagement methods are also effectively building bridging and linking social capital in each city by connecting residents to service organizations and resources in their community and creating more directly communication avenues for resident input to be included in local governance. In Medford in particular, multilingual community liaisons are carrying out linguistically inclusive engagement that is suited to building longer-term trusting relationships between residents and city government. However, these findings about social capital come only from the perspective of city and CBO staff and should be evaluated from the perspectives of residents themselves to ascertain the full extent of social capital development.

Resident Influence in Community Engagement

Resilience hub frameworks and literature frame resilience hubs as resilience interventions that are co-developed and shift decision-making power and agency to community members. The engagement methods used in each resilience hub project achieve this goal to a greater extent than climate action plan engagement, but still leave room for improvement. In Medford, community liaisons and the Medford Connects program have done a good job of consulting residents and CBOs about community needs, and interviewees indicated that those needs will directly shape the resilience hub, but more evaluation will be needed once the hub is truly being implemented. In Cambridge, the informal relationships between CCC staff and residents exhibit characteristics of informing and consulting with residents, but also include aspects of collaboration and partnership because of CCC's commitment to responding to needs identified by community members. The informality of these relationships is likely beneficial for supporting trust and familiarity between CCC and its community. However, informal relationships are harder to evaluate because they don't fit neatly into existing community engagement frameworks and should be researched in more depth, especially since resilience hub guidance encourages use of these kinds of trusting relationships as a foundation for success.

Although resilience hubs are meant to serve community needs every day, during disruptions and in recovery, most of the input and interactions with community members revolved around everyday needs and did not use climate-change related framing. Interviewees from both cities discussed how it was easier to build support for the projects and gather input by talking to people about their everyday needs. Additionally, interviewees mentioned that talking directly about climate change could be a turn off for people, or even make them wary of the project, likely connected to the ways that climate-related projects can affect displacement and have had negative consequences for communities of color in the past. These are valid concerns from marginalized communities and all resilience hub projects will have to grapple with how to discuss resilience hubs with their target communities without perpetuating oppressive and exclusionary practices.

Where Do Resilience Hubs Stand in Cambridge and Medford Today?

The resilience hub projects in Cambridge and Medford are ongoing, each are still in the process of planning for and implementing resilience hub systems. Most recently, Medford has received funding for improvements to a physical building that will likely become the city's first resilience hub site in the future. Additionally, the City is continuing with community engagement efforts which will soon focus on emergency preparedness for residents in the face of climate disruptions. CCC have completed many of the feasibility and design plans for their energy resilience improvements and are now working on funding and installing those improvements. The City of Cambridge continues their work of boosting community resilience through the Neighborhood Energy program, which is identifying other trusted community spaces that can serve similar needs as CCC in other neighborhoods.

Recommendations for Resilience Practitioners

1. **Municipal staff and other practitioners should prioritize information about vulnerabilities and needs that come directly from community members and CBOs to inform resilience hubs.**

Climate impact data may provide foundational knowledge about what disruptions a resilience hub building should be able to withstand, but should be secondary to direct community input when planning programming and services. Community members have more detailed understandings of their own needs and the many factors at work within their communities, and relying on their expertise will allow resilience hubs to be more adaptive and increases the likelihood that residents will actually use the space. It is also critical for municipal governments to build effective methods for documenting local knowledge gathered and the process for gathering it, so that the process can be clearly explained to the public and shared with other municipalities and organizations doing similar work. This guidance is supported by resilience literature, the USDN framework and the experiences of practitioners in Cambridge and Medford.

2. **When engaging directly with residents, community engagement materials and activities should be linguistically inclusive and make use of non-traditional formats, like a community liaison program.**

To best engage and establish trust with the populations most impacted by climate disruptions, who resilience hubs are intended to serve, community engagement must cater to the languages and lifestyles of those populations. This may mean conducting outreach in multiple languages, at different times of day, or creating less formal and more accessible forms of engagement than traditional public meetings and surveys. Examples from Medford and Cambridge include translating written materials and offering interpretation services at events, hosting community engagement events in familiar public spaces like parks or frequented community centers, and providing space for community members to express their ideas through casual conversations rather than in formal public meeting settings. Conducting outreach this way means that target communities might be able to participate in a more meaningful way and helps build trust in the resilience hub, in addition to potentially building more trust and linking social capital between community members and local government. The Medford Community Liaisons program is a

strong example of culturally responsive and linguistically inclusive engagement that can serve as a model for other resilience hubs.

3. **Frame resilience hubs as more than climate-related programs, such as focusing on social determinants of health, emergency preparedness, or community building, to better engage with residents and promote de-siloed municipal work.**

Practitioners in Cambridge and Medford highlighted how talking about their resilience hubs in terms of increasing impacts from climate change was not an effective way of building support for the projects amongst their community members. Instead avoiding technical jargon and framing the benefits of resilience hubs in terms of improved health outcomes, community-building, and emergency preparedness resonate more with community members. Starting conversations about resilience hubs with these types of frames might be a more effective way to improve trust and build social capital by encouraging residents to think about how their connections to others and community resources is important for wellbeing, health, and safety. Information and conversation about worsening climate impacts may come at a later stage in the engagement process. Additionally, approaching resilience hubs from a climate and public health lens allowed for cross-departmental collaboration in Medford and has been useful in their pursuit of grant funding for the resilience hub project, indicating a similar approach may be useful for other practitioners aiming to improve public health and climate outcomes.

4. **Municipalities identifying existing CBO spaces to transform into resilience hubs must critically assess the capacity of the CBO to take on the work and the municipality's own capacity to provide support for the project.**

One of the greatest challenges to the approach that the City of Cambridge and CCC took was finding a CBO with sufficient capacity to take on the long-term project of becoming a resilience hub. Beyond the years-long work to implement programming and building upgrades, being a resilience hub requires a long-term commitment to service community needs, which can be challenging when CBOs already face limited staff capacity and funding. Therefore, municipalities must have frank conversations with CBO staff about what goes into being a

resilience hub and be prepared to provide ongoing support through technical assistance, pursuing grants, and possibly providing other funding mechanisms to support the project.

Areas for Future Research

Since there is relatively little existing academic literature about resilience hubs, there are many avenues for future research that would provide beneficial insight for future resilience hub projects. A handful of focus areas were identified through interviews and are included here because they were outside the scope of this thesis but would help deepen the field's understanding of resilience hub development.

Understanding Resilience Hub Development from Resident Perspectives

As noted in the limitations section, it was outside the scope of this thesis to interview residents, community liaisons and other key CBO partners for each resilience hub project. Future research into how community members perceive resilience hubs and their sense of agency and decision-making power in community engagement activities would help clarify findings about trust-building, social capital, and equitable community engagement practices. When asked, interviewees from this thesis suggested that key CBO staff, the Medford Community Liaisons, and organizational partners like Climable in Medford could provide additional insights into their projects.

Opportunities and Challenges in Funding Resilience Hubs

Funding was not a topic directly covered by the research questions of this thesis, but the opportunities and challenges of funding resilience hubs came up independently in every interview. Massachusetts' MVP Action Grant program has funded almost the entirety of Medford's project, while Cambridge received grant funding from a variety of government and private sources. Since these projects have been entirely grant funded, it would be beneficial to better understand how grant program priorities end up shaping resilience hub projects. For example, Medford interviewees mentioned that emergency preparedness had not been a

central focus of engagement efforts so far because it is not a central focus of the MVP grant program. Additionally, several interviewees mentioned that their city governments would have to start thinking about how to fund resilience hub costs in the long run, noting that it likely wasn't feasible to always rely on grant funding since resilience hubs are intended to be long-term community institutions. The City of Cambridge and CCC are currently working out what their long-term relationship will be in terms of continued technical assistance and financial support.

Resilience Hub Networks

USDN guidance on resilience hubs stresses that cities should have networks of resilience hubs that serve various neighborhoods, rather than one central resilience hub for the whole city, since different neighborhoods and resident populations will have differing needs (Baja 2019). Interviewees from both cities were also quick to acknowledge that one resilience hub would not be sufficient to meet the needs of the entire city. That is why CCC is envisioned as a pilot resilience hub and the Neighborhood Energy program is identifying other locations across Cambridge as future sites. Future research could investigate the ways a network of resilience hubs work together and how that might build community resilience on a larger scale.

This research has worked to better understand the processes through which resilience hubs are being developed at the municipal level by investigating how resilience hubs fill community resilience related gaps left by other adaptation planning efforts and how community engagement practices play into resilience hub planning. Case studies for Cambridge and Medford were used to explore resilience hub development. The research shows that resilience hub planning builds off of the data gathered for climate action plans and climate vulnerability assessments, but also go further in prioritizing information and input from residents and community-based organizations to inform how resilience hubs are structured. Additionally, the community engagement practices used help build bridging and linking social capital within each municipality and had more participatory and collaborative characteristics than traditional climate

action planning. These findings support the way resilience hubs are framed as spaces co-produced and co-managed by the community, and recommendations are provided for future resilience hub practitioners to make their resilience hub work more collaborative and equitable towards the populations vulnerable to climate impacts that resilience hubs aim to serve.

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Appendix A

Interview Guide

General (5-10 minutes)

- What is your role in [Cambridge, Medford]'s resilience hub project?
- When did [Cambridge, Medford] start discussing and planning for a resilience hub? What sparked initial discussions about establishing a resilience hub?
    - **[Cambridge]** How were Cambridge Community Center and Margaret Fuller House identified as sites for resilience hubs?

Previous Plans/Community Resilience Gaps (15 minutes)

- **[For Municipal Staff]** Before the resilience hub planning process started, how did other municipal plans (climate action plans, resilience plans, hazard mitigation plans, etc.) address community resilience? Did they address community resilience at all?
- **[For CBO Staff]** Before the resilience hub planning process started, how do you think the City [Medford or Cambridge] was addressing community resilience (i.e. any specific programs, initiatives or published plans, etc.)? Did they address community resilience at all?
  [Optional Follow-up] What community resilience concerns/needs do you think were left unaddressed by prior to the start of resilience hub development?

Identifying Community Resilience Needs (15 minutes)

- How were community resilience needs identified in the resilience hub planning processes (e.g., metrics, community engagement, gap analysis, etc.)?
    - **[For Municipal Staff]** Did the information gathered in previous plans inform what needs are being addressed through resilience hubs?
    - **[For CBO Staff]** Were there community resilience needs you/your organization was already aware of? How did you learn about those needs?

  [Optional follow-up] Were there any key metrics that were used to evaluate climate vulnerabilities or community-resilience related needs?
  [Optional follow-up] Are there any aspects of community resilience you think weren't adequately addressed in the planning process?

Community Engagement (15 minutes)

- How was community input incorporated into the resilience hub plans (informed vulnerability assessments, brainstormed programming ideas, helped with site selection, etc.)?
    - Were there some parts of the planning that were more influenced by community input than others?
- **[Optional Follow-up]** What practices were used to engage with community members as part of the planning process (i.e. surveys, focus groups, community liaisons, etc.)?
- **[Optional Follow-up]** What kinds of information did community engagement activities try to collect (climate impacts experienced by residents, ideas for resilience hub programming, etc.)?

Closing (<5 minutes)

- Is there anything else you'd like to share that we haven't already covered?
- Any other key staff or organizational partners who should be included in interviews?