

The State of Climate Resilience and Climate Mitigation Efforts at Essential Hospitals

Findings and Recommendations from a Formative Evaluation







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ABOUT AMERICA'S ESSENTIAL HOSPITALS

America's Essential Hospitals is the leading champion for hospitals and health systems dedicated to high-quality care for all, including the most vulnerable. We support our more than 300 members with advocacy, policy development, research, and education. Communities depend on essential hospitals to provide specialized, lifesaving services; train the health care workforce; advance public health and health equity; and coordinate care. Essential hospitals innovate and adapt to lead the way to more effective and efficient care. Learn more at essentialhospitals.org.

ABOUT ESSENTIAL HOSPITALS INSTITUTE

Essential Hospitals Institute is the research, education, dissemination, and leadership development arm of America's Essential Hospitals. The Institute supports the nation's essential hospitals as they provide high-quality, equitable, and affordable care to their communities. Working with members of America's Essential Hospitals, we identify promising practices from the field, conduct research, disseminate innovative strategies, and help our members improve their organizational performance. We do all of this with an eye toward improving individual and population health, especially for vulnerable people.

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Executive SUMMARY



Climate change presents a significant threat to health on multiple levels. Rising temperatures, more frequent extreme weather events, sea level rise, and increasing carbon dioxide levels are all environmental effects of climate change that lead to downstream impacts on human health.

For example, changes in climate may result in food and water supply shortages, causing malnutrition. Flooding contaminates the existing water supply, leading to more cases of water-related illnesses. The changing climate also threatens air quality, increasing respiratory disease.

Health care, ironically, contributes to the problem—even as it plays a key role in the solution. The U.S. health care sector accounts for about 10 percent of the carbon dioxide generated in the United States.ⁱ Indeed, pollution adversely affects the health of roughly the same number of people who die each year in hospitals from preventable medical errors.ⁱⁱ

Essential hospitals serve patients and communities at heightened risk for the health effects of climate change—they are disproportionately low-income, uninsured, racial and ethnic minorities, and complex in their clinical needs.ⁱⁱⁱ Nearly half of inpatient discharges and outpatient visits at essential hospitals are for Medicaid or uninsured patients.^{iv} These communities include about 360,000 homeless individuals and 10 million people with limited access to healthy food. More than 25 million families in these communities fall below the poverty line, and more than 17 million individuals lack health insurance.^v When considering the range of threats from climate change, these groups are among the most exposed, most susceptible to health and economic problems, and have the fewest individual resources to prepare for and respond to health threats.^{vi} For example, in the long term, some communities of color face higher than normal exposure to pollutants that cause health problems, and during flooding or a hurricane—resulting in stays at crowded shelters—low-income communities are exposed to higher physical and mental stress levels.

Essential hospitals also are vital anchor institutions that are profoundly connected to the well-being of the people and communities they serve. This connection extends beyond the simple treatment of illness and disease into work to influence the social factors and lived environment that impact health for their patients and community. As climate change alters that lived environment, essential hospitals are beginning to recognize their role as part of the problem and embrace their role as part of the solution. But essential hospitals also require special considerations when it comes to costly infrastructure changes to improve their resilience to climate change. Such changes are complicated by resource constraints, regulations, and severe weather events. Essential hospitals, on average, operate with little or no margin, affecting their ability to fund practices that mitigate climate change or build climate resilience.^{vii} While hospitals perform mandated upgrades that support climate resilience, strategies to support essential hospitals and their special constraints are lacking.

Support from the Kresge Foundation has allowed Essential Hospitals Institute to research how essential hospitals are building climate resilience and mitigating climate change. The Institute surveyed essential hospitals, interviewed key informants, and convened essential

hospital leadership at the organization's annual conference to gather information. The Institute identified barriers to progress, highlighted potential facilitators to success, and determined resource needs of essential hospitals to improve their capacity.

This document presents findings categorized into five topics: practices related to building climate resilience; practices related to mitigating climate change; leadership and funding; community engagement; and partner and coalition participation.

The findings from this project identified five key recommendations for policymakers and funders:

1

EDUCATE LEADERSHIP AND GOVERNANCE. Target increased awareness about building climate resiliency and the link between climate and health at the hospital leadership level. Leadership is key for uptake and funding of new practices and technology. Leaders identified a need to see the link between climate and health. At the same time, hospital staff reported how leadership ultimately made the decisions to implement practices that support sustainability. Because hospital governing boards provide guidance and contribute to the organization's strategic vision, it will be important also to raise their awareness of the health impacts of climate change.

2

SET GOALS FOR SUSTAINABILITY AND RESILIENCE PRACTICES. Identify measurement tools and set targets for sustainability and resilience practices. Goal setting is critical to driving change and prioritizing next steps. Most essential hospitals were monitoring energy usage and, to a degree, water and waste, but few set specific targets. Many hospitals reported that monitoring was not specific enough to identify what aspects of their hospital were the most wasteful. For the few hospitals that set goals, they were comprehensive and far-reaching, such as including targets for electricity, water, and waste.

3

INVEST IN CLIMATE RESILIENCE AND SUSTAINABILITY. Invest in practices that build climate resilience and mitigate climate change. Many member hospitals are investing in climate resilience practices; however, it takes substantial finances to make changes that would have a significant and lasting impact. In some cases, hospitals have used sustainable practices when designing a new building or substantially refurbishing an older building. In other cases, hospitals received additional outlays, such as a grant, bond, or federal funding to resist or prevent a potential health threat such as a specific influenza outbreak.

4

IDENTIFY PRACTICES WITH IMMEDIATE RETURN ON INVESTMENT. Identify concrete climate resilience practices that will bring immediate return on investment. Some hospitals implemented practices to build climate resilience and mitigate climate change because of regulatory requirements or because of a severe weather event. However, a major reason for changes was improved operational efficiency that led to cost savings. Hospitals valued practices with a return on investment, not just because it saved money, but also because those savings could be used for patient care. In some cases, savings also enabled them to fund additional practices that supported sustainability.

5

PROMOTE COALITIONS AND PARTNERSHIPS. Promote the value of coalitions and local partnerships to identify promising practices and set goals. Some hospitals participated in coalitions, yet many participated in local partnerships with waste companies and utility companies. Coalitions were critical because many staff did not have internal expertise and obtained promising practices, identified measurement tools, and, in a few places, collaborated to purchase renewable resources. Waste and utility companies assisted hospitals by identifying methods to reduce waste.



INTRODUCTION

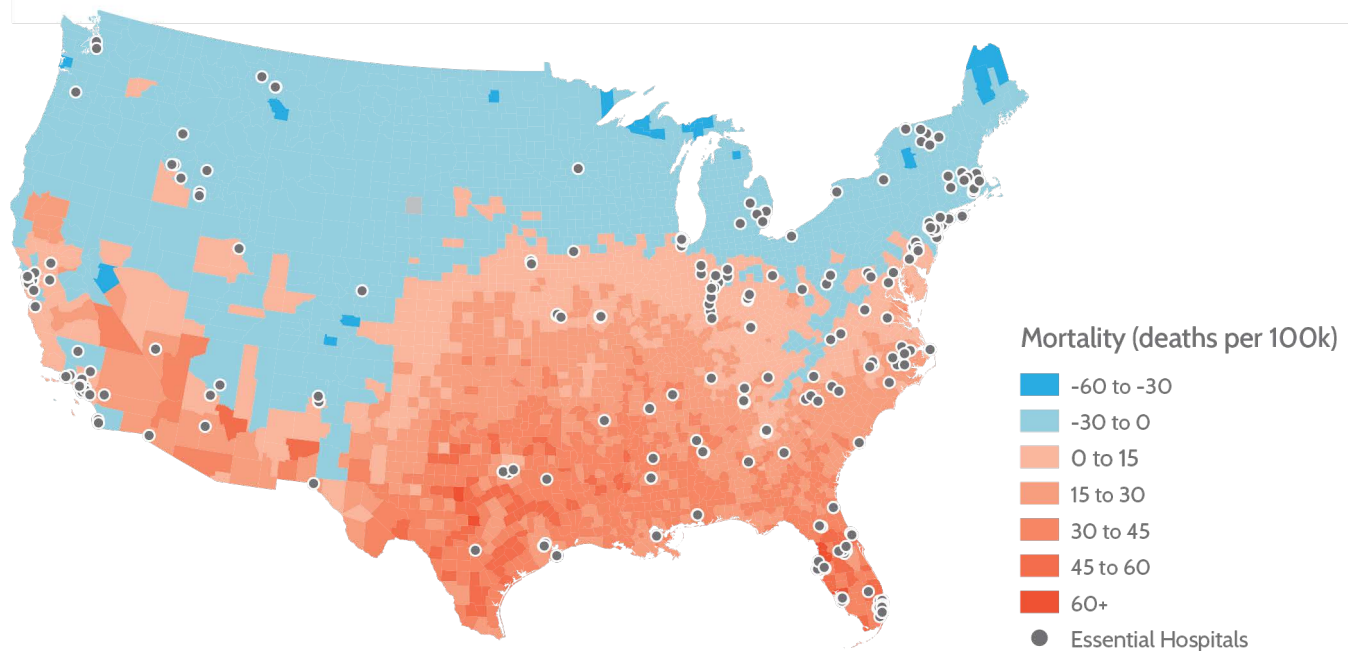
Climate change includes warming temperatures, changes in precipitation, increases in the frequency or intensity of some extreme weather events, and rising sea levels. As climate change increases the occurrence of storms and extreme weather, vulnerable populations will be the first to experience negative impacts.

Low-income populations and some communities of color are often already burdened with poor environmental conditions and will be disproportionately impacted by and less resilient to climate change.^{viii} With rising temperatures come heat-related fatalities; the elderly, those living in poverty or social isolation, and those with a mental condition are more likely to suffer an adverse event from heat-related disorders such as heatstroke.^{ix} Poor air quality from emissions and warming temperatures can increase or exacerbate respiratory conditions, such as asthma and allergies, which adversely impact the young and the old, people living in poverty—often in high-pollution areas, and those with chronic conditions.^x Those who experience an extreme weather event, such as a significant hurricane, are at increased risk of mental health issues, and that risk often is exacerbated for people with low incomes.^{xi}

Even as health care institutions prepare and care for patients and communities facing climate-related health issues, the industry also contributes to climate change. In 2013, the health care industry accounted for nearly 10 percent of U.S. greenhouse gas emissions. Hospital care alone was responsible for the release of 238 million metric tons of greenhouse gas into the atmosphere.^{xii} Hospitals' energy consumption, waste production, transportation needs, and supply chain activities also contribute to other environmental hazards such as acidification, ecotoxicity, smog, and eutrophication.^{xiii}

Essential hospitals and health systems—those that treat a large proportion of vulnerable patients—are in a unique position to drive population health improvements. These hospitals occupy central positions in the community as main providers of care, large employers, and sources of community resources. Their experience caring for complex patients with needs that go beyond medical care gives essential hospitals a deep understanding of their community's needs. Most essential hospitals are also in areas that will see increases in mortality because of climate change^{xiv} (see Figure 1, page 6). Thus, essential hospitals also require special considerations when it comes to costly infrastructure changes to improve their resilience to climate change. Resource constraints, regulations, and severe weather complicate such changes. Essential hospitals, on average, operate with little or no margin, affecting their ability to fund practices that mitigate climate change or build climate resilience.^{xv} While hospitals perform mandated upgrades that support climate resilience, strategies to support essential hospitals and their special constraints are lacking.

Figure 1. Annual Median Mortality Attributable to Climate Change by 2080



Hsiang, S., Kopp, R.E., Jina, A., Rising, J., Delgado M., Mohan, S., Rasmussen, D.J., Muir-Wood, R., Wilson, P., Oppenheimer, M., Larsen, K., and Houser, T. (2017). Estimating economic damage from climate change in the United States. *Science*. doi:10.1126/science.aal4369

The Institute—the research, education, leadership, and dissemination arm of America’s Essential Hospitals—set out to better understand essential hospitals’ current efforts to reduce their carbon footprint, control pollution, and build climate resiliency. With support from the Kresge Foundation, this research project collected qualitative and quantitative data. These findings are a result of three activities. The first was a survey of America’s Essential Hospitals members in which we identified the extent and the ways hospitals are adopting practices that build climate resilience and mitigate climate change; the facilitators and barriers to those practices; and how they engage the community, partners, and coalitions. Second, the Institute conducted interviews with a subset of survey respondents to better understand the experiences of essential hospitals. Third, the Institute convened a forum to understand leadership perspectives and how they determine funding. In this report, we explore engagement with their communities in environmental sustainability and disaster preparedness efforts, investment in practices that mitigate climate change and climate resiliency, motivations to facilitate the practices, and barriers to facilitate the practices. Our findings are structured around building climate resilience, mitigating climate change, influencing through leadership and funding, engaging the community, and involving partners and aligning with coalitions. A full description of the research questions and methods can be found in Appendix I.

Building CLIMATE RESILIENCE



Climate resilience is the capacity of an institution to anticipate and respond to the impacts of the changing climate, while retaining function, structure, and identity. This includes preserving, restoring, and/or improving the institution.^{xvi}

In this section we present essential hospitals' motivations to prepare for major weather events and to make facility-level infrastructure changes to support climate resilience.

Hospitals face extreme weather events that prompt infrastructure improvements to build climate resiliency. Hospitals are anchor institutions in their community and must be resilient to provide a sanctuary when the community is in need. Hospitals face varying structural vulnerabilities due to extreme weather events based on geographic location. Survey respondents were asked to select the three extreme weather events that pose the greatest risk to their community. Slightly more than half cited floods and heat waves as the top two extreme weather events that pose a risk, followed by extreme cold or snow and tornadoes or wind, at just below half. Extreme weather events can lead to power outages that result in the loss of temperature control, the use of vital systems and medical equipment, and lighting. Each of these outages can endanger patient care. More than half of the key informants reported making or planning infrastructure changes to their hospital or health systems in reaction to a recent extreme weather event.

“We had a flash flood on the campus, and we almost got to the point where we were flooded the lower level of the hospital. Part of it had to do with the layout, but also this unprecedented storm. It really showed the vulnerability of the hospital to those type of situations.”

– *key informant*

“We are building a new hospital that will be very resilient ... this decision was made in large part after the 2014 polar vortex nearly disabled our hospital.” – *key informant*

Given infrastructure vulnerabilities that were exposed by weather events, hospitals made several changes to better prepare for the future and to ensure that patient care is not interrupted. The top changes included connecting the heating, ventilation, and air conditioning (HVAC) system to a backup power supply to ensure proper temperature control and ventilation; creating a backup power supply using onsite power generation to use in power outages; and expanding emergency power capacity.

Regulatory requirements are a main driver of many of the climate resilience activities hospitals and health systems implemented. In addition to extreme weather events, almost half of key informants mentioned implementing facility-level infrastructure elements at their hospital or health system due to a regulation or mandate put forth by their city, state, the Centers for Medicare & Medicaid Services (CMS), or the Joint Commission.

Some key informants discussed specific regulations by CMS and the Joint Commission that require hospitals to make significant changes to their emergency management program. One key informant explained that it is easier for administrators to recommend actions related to climate resilience, weather event preparation, and climate change mitigation to their hospital governing boards when they are tied to a regulatory requirement. However, one key informant mentioned that with few staff, it can be more difficult to do other sustainability-related projects when they are exclusively focused on regulatory compliance and preventive maintenance.

The survey did not ask about risk assessments specifically, yet, unprompted, a quarter of key informants reported the value of conducting a risk assessment to building climate resiliency. A risk assessment is one regulation that is mandated by both CMS and the Joint Commission to create the hospital's emergency operations plan for accreditation. These key informants said it was critical to assess system-level vulnerabilities and create an action plan to address those vulnerabilities. This assessment identifies the hospital's risks, and the likelihood and impact of each. From there, a team develops a plan to mitigate the identified risks.

New construction creates opportunities to build and implement hospital resilience

in a cost-effective way. In a few cases, key informants were in the process of constructing or renovating a hospital or building and were able to implement resilient infrastructure from the beginning. New building provides an opportunity to purchase and install efficient technology at the outset and to plan accordingly, minimizing costs and staff time.

“[We installed new HVAC systems] in some, but not all, of the hospitals. It has not been done in the old hospital. The decision was made on the two new hospitals. They were new, and it is hotter than it used to be.” – *key informant*

Patient safety was cited as a facilitator to improve the resilience of the hospitals'

built environment. Two key informants discussed the importance of improving climate resilience to ensure patients can physically access hospital grounds and receive uninterrupted quality care. One key informant stated that hospital leadership provides economic support for resilience activities solely because of patient safety. Some key informants cited their mission statements and role as a safety-net provider as important reasons to strengthen their hospital's resilience, thus improving patient safety and experience.

“Because we're a safety-net hospital, our base is different than the vast majority of other hospitals because we are serving underinsured, uninsured, Medicaid [patients] and so forth for the most part. So we really do a lot of extra effort to make sure that it's a good experience for the patients; I mean it's a bit of a refuge for them.” – *key informant*

Mitigating CLIMATE CHANGE



Efforts to mitigate climate change refer to endeavors to “reduce or prevent emission of greenhouse gases. Mitigation can mean using new technologies and renewable energies, making older equipment more energy efficient, or changing management practices or consumer behavior.”^{xvii} This section describes essential hospitals’ key motivations and challenges when mitigating climate change.

Leadership support is key to upgrading infrastructure that mitigates climate change.

Two-thirds of key informants noted that the decision to upgrade infrastructure came from leadership, and, in most cases, the decision was based on return on investment. The types of leadership involved varied—from boards of directors and C-suite (particularly the chief executive officer and the chief financial officer) to external leaders, such as the county or university, depending on who held the ultimate authority. One key informant pointed out that despite the potential to provide benefit to the community, it is not as easy to make a case for hospital activities related to climate mitigation and resilience without a return on investment. This key informant said, “If there’s a big financial benefit, then that usually becomes top priority versus ‘we want to save the world.’ That’s not as easy to sell....”

In a few cases, the facilities or support services department made the decision to upgrade some sort of infrastructure that mitigates climate change. Even when they were upgrading in a way that mitigated climate change, cost savings and ease was at the forefront. For example, upgrading lights to be more efficient reduced costs and did not interrupt hospital services.

Benefit to the community was cited as a motivating factor for hospitals’ climate mitigation work. More than a third of the key informants discussed the importance of being a good corporate citizen and managing the impact of hospital operations on their communities. Many key informants discussed the intersection between environmental sustainability and good outcomes for staff and members of the community. Several key informants discussed the importance of doing their due diligence and making sure that each decision is right for the communities they serve, whether that is from growing and giving out food from their gardens, using safer green chemicals in their practices, or ensuring their built infrastructure allows them to keep their doors open. One key informant said: “Overall, we have to do our part, and we can’t continue to generate this level of waste, and depending on what it is, pollution, and not expect that there will be ramifications down the line.”

Financial benefit was a driver to upgrading building systems. More than half of survey respondents described financial benefit as a primary motivator for their organization to upgrade buildings. Key informants echoed this finding; most key informants reported that a financial benefit was a critical motivator for upgrading facilities. Similarly, almost two-thirds of survey respondents said that improving operational efficiency was a primary motivator for their organization to adopt changes. Hospitals’ most common upgrades supported these findings: The most frequent upgrades, reported by slightly more than

half of the survey respondents, were improvements to building control and automation systems and upgrades or replacements of HVAC systems. These modernizations improve operational efficiency as well as produce substantial cost savings. Key informants clarified that improving operational efficiency led to savings on utility costs and therefore to financial benefit.

“Our main priority is to upgrade the HVAC system – everything is tied to that – so that we can have occupancy sensors in the rooms, and we can have night setbacks on temperature to save energy. Each thermostat can have an occupancy sensor on it. So the air handler is running 20 percent as opposed to 100 percent throughout the night. There’s a lot of savings there. With jobs like that, there’s a big upfront cost associated with doing that, especially when replacing legacy controls.” – *key informant*

In addition to activities that brought significant savings, several key informants invested in low-cost energy efficiency projects, such as upgrading to light-emitting diode (LED) lightbulbs, to save money on energy costs over time. In fact, most survey respondents already have or planned to install energy efficient lighting. These energy savings offered financial incentives for hospitals to invest in upgrades to improve energy efficiency because they provide consistent and significant return on investment.

“Energy [reduction is a top priority] because there’s substantial cost savings available there, and an opportunity to save the system money while at the same time reducing our greenhouse gas emissions. So, I think to get those early wins is a good focus, to show demonstrated savings, which can help fund additional sustainability efforts.” – *key informant*

Hospitals prioritized projects to improve operational efficiency and reduce energy usage over other sustainability projects because they provided greater return on investment. Four out of five survey respondents stated that cost was a challenge to engaging in activities that were not directly linked to operational efficiency or reduced costs. Whereas more than half of respondents initiated some sort of energy-reducing activity, only about a third initiated water or solid waste reduction activities. Those who did undertake such activities focused on installing low-flow plumbing for water reduction and environmentally preferred purchasing, both of which are relatively low-cost activities. Unprompted, many of the key informants described how important sustainability is; many also described the importance of having financial incentives to implement projects in their key informant interviews.

“[Energy reduction] is where I can have the biggest impact with what I manage – both financial and climate impact. The amount of energy the hospital consumes is the biggest component of a budget a facility manager can manage.” – *key informant*

Building a new hospital or substantially refurbishing a building provides an opportunity to use the most efficient products. Two-thirds of the key informants reported that significant building enhancements primarily occurred when building a

new hospital or substantially refurbishing a current one. When building a new hospital or substantially refurbishing an older building, hospitals already must buy new products. Given this opportunity, the hospital or consulting staff identify the most efficient products, knowing they provide consistent and significant return on investment. Some hospitals report a cost savings of \$3,000 a day and about \$1 million a year.

There is a lack of full-time staff dedicated to improving environmental sustainability and building resiliency. Three-quarters of survey respondents stated that staff time limitations prevented their hospital from carrying out as many activities as they wanted. Many hospitals and health systems do not have staff dedicated to sustainability. Instead, this work is being spearheaded by facilities management and other departments that must balance it with other priorities such as maintaining day-to-day operations.

Age of building prevented hospitals from upgrading building systems.

A few key informants noted that the age of their buildings created difficulties in upgrading. In one case a participant noted that simply recycling was difficult because there are no easy spaces for various recycling bins. In one hospital system whose multiple buildings were constructed at different times, even something as simple as lightbulb replacement required changing major parts of the fixture due to it causing a strobing effect for the newer LEDs.

CASE STUDY

Mitigating Climate Change: Atrium Health's Practices

BACKGROUND: Atrium Health includes more than 900 locations across the Southeast, including more than 40 hospitals. Critical weather threats include hurricanes, coastal storms, tornadoes, severe wind, and heat waves.



Activities to mitigate climate change: Atrium Health's energy management team is interested in reducing greenhouse emissions and, like many of the hospital representatives interviewed, also is driven by financial incentives because of the potential cost savings. The hospital group has a program called Energy Connect where key facility staff at each site are trained to identify problems and solutions to improve operational efficiency, thereby reducing energy usage and cost.

Through a partnership with a local university in North Carolina, they began training staff in 2017 with the goal of training staff at each site. The program helps the entirety of Atrium Health make decisions about equipment and needed changes. Ultimately, they have seen a 20 percent reduction in energy use, the equivalent of taking three hospitals off the grid. To achieve this, they installed energy-efficient LED lighting and room occupancy sensors, upgraded medical equipment, upgraded building and control systems, upgraded HVAC systems, and updated the building management system. For the past two years, they received ENERGY STAR® Partner of the Year Awards.

Staff noted the importance of being intentional and focusing on activities that will bring the most return. "There are high-value and high-exposure activities we can do, and we can look at how that is perceived by the community and others," one key informant said. "But it is important that we develop a strategy that works for us; our risks may be different than other systems. So, we just want to be intentional in this space and see what our opportunities are versus identify an activity as 'the sexy thing to do' now in health care but it does not align with our risks and our needs."

Influencing Through LEADERS AND FUNDING



Leadership plays a critical role in determining a hospital's priorities and goals, as well as in influencing the wider community. Part of leadership's function is uniting the health system staff with a mission or vision statement and describing the organization's priorities. This section presents the findings related to leadership and funding sustainability efforts.

Hospitals lack the substantial funding to mitigate climate change. Most survey respondents said competing priorities within their organization present challenges to making infrastructure improvements that support climate change mitigation and/or building resilience. Five key informants discussed competing funding priorities as a barrier to climate-related projects at their hospitals. Key informants pointed out that health care facilities have a responsibility to provide high-quality care to patients, so efforts directly related to patient care are prioritized over climate mitigation and resilience efforts. Several key informants gave examples of balancing priorities—replacing older imaging technology such as magnetic resonance imaging (MRI) machines or computerized tomography (CT) scanners versus climate mitigation projects.

“We deliver level I trauma services, and the CT scanner in the emergency department is at the end of its life, and for us to continue to have that designation and provide high-value care, do we spend \$1.2 million on a CT scanner or do we spend \$1.2 million on this energy piece?”

– *key informant*

Thus, when hospitals funded sustainability efforts, the main reasons for doing so were because of a severe weather event or new regulation. One forum participant stated, “The power of regulations—while I think we are overregulated to begin with—the regulations are effective in driving change.”

Leaders drive initiatives, but they need encouragement to understand the link between climate and health. As noted earlier, leadership is the decision-maker for most changes and funding decisions. Many of the key informants discussed climate change and its connection to public health, making it clear they understood how their hospital's operations and its carbon footprint contributed to climate change. However, some key informants and forum participants said leadership did not recognize the link between climate and community health. Additionally, hospital governing boards often can provide input and guidance on decisions that affect the sustainability of a hospital's operations. Hospital governing boards that are educated on the downstream effects of climate change and how their health system contributes to the problem can offer solutions and vocally support increased action to improve mitigation and resilience efforts.

“There are so many other competing issues that are seen as more urgent to address for the community, like the opioid epidemic, heart disease, and vaccinations. Without having direct impacts in the community, it makes it a harder case to bring to leadership.” – *key informant*

One forum participant's comment articulated why the focus was not on climate resilience and mitigating climate change: "Our board has never asked a question about [climate change] In a crazy way, this is a problem of the rich. I would love to have the time, breadth, resources, but I need to worry about this guy who needs his penicillin." Conversely, leadership is more easily convinced to move on projects when presented with the business case for making investments in environmental sustainability practices that offer financial benefits.

"Senior leaders need to understand, especially when you are talking about energy, that there is an opportunity to improve operations, and improved operations results in savings. And if you have senior leadership that understands that, you can make a lot of progress." – *key informant*

Hospital operational budgets funded most hospital-based climate mitigation activities and, to a lesser degree, climate resilience activities. All survey respondents reported funding climate mitigation activities through operational budgets, although tax credits, government grants, and philanthropic grants also supported the activities. In contrast, two-thirds stated that the operational budget supported climate resilience activities, and a quarter said their hospital did not conduct any activities related to climate resilience.

Energy efficiency projects support future sustainability activities or staff. Some key informants discussed how implementing energy efficiency projects yielded energy savings that were then used to fund other sustainability projects. One key informant explained that although competing funding priorities are a challenge, money saved through improved operational efficiency can be put toward funding projects lower on the priority list. Some key informants said they were able to hire more staff to support sustainability projects with savings from projects. One key informant even said that in their hospital, management would receive half of the savings, and their facilities department would receive the other half, enabling them to fund staff or other energy, water, or waste efficient activities.

"When we are constrained, as I assume everybody is, we have to justify changes against things like 'should we buy a new PET/MRI so that patients can be treated with the lowest radiation dose possible for their imaging, or do we want to do an energy overhaul of a building?' And some of those conversations are easy if you can bring your own funding, which is what we do with the energy savings." – *key informant*

Most hospitals monitor energy, water, and waste to improve efficiency. Almost all hospitals monitored both energy and water consumption, and two-thirds monitored waste generation. At the same time, almost half of key informants, unprompted, identified the need for specific monitoring to determine savings and identify priorities. It was not enough to monitor energy generally; participants also needed to know energy costs by unit, e.g., HVAC systems, otherwise they are unable to measure the impact of new practices and the cost savings.

Some key informants described the importance of evaluating vendors' ability to track and report waste production, types of waste, and overall environmental impact. Measuring energy, water, and waste from different sources allows hospitals to track costs and consider changes. One hospital, through rigorous vendor vetting, was able to partner with a waste management company with the tools to better understand their waste streams and evaluate whether their targeted sustainability initiatives are creating an impact.

“We are evaluating the possibility of eliminating all of our documents storage and shifting to digital so we can eliminate or reduce as much as possible the use of printed paper, copiers, etc. So that will be a good way to track that waste output. If all of the initiatives that we put in place have an impact, then we should see a huge reduction of that waste output.” – *key informant*

Fewer than half of the hospitals set performance targets and rarely made formal commitments to enhancing their infrastructure to mitigate climate change or build climate resiliency. The few hospitals that had formal commitments or set performance targets, set targets that are comprehensive and high. Key informants with targets often had more than one target, usually including both energy and water, to control costs. In some cases, goals included being sustainable or participating in a larger community or city effort to reduce energy, water, and/or waste.

CASE STUDY

Building Climate Resiliency through Leading and Funding: The Story of the Ohio State University Wexner Medical Center

BACKGROUND: The Ohio State University Wexner Medical Center is an academic medical center consisting of seven hospitals and multiple ambulatory care locations across the state. The main climate threats include extreme cold and snow, floods, and tornadoes or other wind events.

Wexner Medical Center's leadership supports building climate resiliency. In 2015, University President Michael Drake affirmed the university as a signatory institution on the American College and University Presidents Climate Commitment, underscoring Ohio State's commitment to mitigating climate change and building climate resiliency. In addition, the university set forth aggressive university-wide sustainability goals. The university created a committee called the President and Provost's Council on Sustainability made up of students, faculty, and staff.

On July 6, 2017, Ohio State transferred operation of campus utility systems that deliver heating, cooling, and electricity to ENGIE Buckeye Operations on behalf of Ohio State Energy Partners (OSEP). The partnership included a \$1.015 billion upfront payment to the university and a \$150 million commitment to support academic priorities. The agreement also provides upfront capital to help advance Ohio State and OSEP sustainability goals, which include improving energy efficiency by at least 25 percent within 10 years and achieving carbon neutrality by 2050.

In addition, the university is modifying and elevating a main roadway between the medical center and the Olentangy River. The \$51.9 million construction project provides 100-year flood protection through a new, certified levy and creates 18 acres of new greenspace along the river. The greenspace provides both stormwater management and informal recreation to the Wexner Medical Center area.



**THE OHIO STATE
UNIVERSITY**

WEXNER MEDICAL CENTER

Engaging THE COMMUNITY



Essential hospitals play a critical role in their community when severe weather events occur. They provide support to the community at large while continuing to treat patients – those already hospitalized and those newly affected by the severe weather.

These responsibilities make it critical that hospital systems are resilient to climate change. Understanding how hospitals engage their community outside of severe weather events can help identify next steps for policymakers and funders.

Leadership support is essential for enhancing community engagement, and both leadership and facilities determine community engagement practices. More than half of key informants reported leadership support as critical to engaging with the community. Whereas leadership was integral for activities related to mitigating climate change and climate resiliency, either leadership or facilities management personnel were equally likely to direct and determine an activity with the community. Leadership was identified as important for driving ideas within the hospital, as well as for signing off on funding and internal support. Facilities staff was identified as critical to determining new activities and formulating a plan to engage the community. A few key informants said their hospital needed to be internally aligned between leadership and facilities before it could engage with the community on a more meaningful level, otherwise the community might not appreciate it.

“The community is already pretty engaged. I would say, for full transparency, that there’s a little bit of risk on my part in terms of getting a large group riled up and then me facing the obstacles with executive leadership; it becomes an awkward situation for me.” – *key informant*

Community engagement included both hospital staff and the community and focused on sustainability. Survey respondents and key informants identified common community engagement activities such as:

- leading a community cleanup;
- training community members on recycling, waste management, and other environmental sustainability activities;
- supporting alternative transportation;
- presentations to students on sustainability; and
- holding Earth Day gatherings.

Engaging the community also meant including hospital staff. In some cases, the purpose of engaging community members was to improve community relations. A couple of hospitals held days during which they picked up trash in the area around the hospital campus to send the message that the hospital is a good neighbor. Slightly less than a third of survey respondents acknowledged that they did not engage their community in climate efforts at all.

Hospitals engaged with community members primarily related to patient care.

While many key informants reported that their hospitals included community members in decision-making, this engagement focused on patient care. After describing community interactions, it often emerged that key informants worked with community members almost exclusively related to patient care.

“I think honestly the thing that would prevent us from doing that type of outreach is that our community outreach program is more patient-care centered and less sustainability centered. I get the idea that sustainability hasn’t really been a thing at our hospital; just looking at all of the categories in your survey, for me, it kind of put a lightbulb on in my head that maybe I should be engaging with the community outreach department and trying to find, or proposing things, that might be more sustainability-related. And I’m sure that they would be totally on board with that.” – *key informant*

Involving Partners and **ALIGNING WITH COALITIONS**



As essential hospitals look to mitigate their contribution to climate change by making changes within the hospital, some also have leveraged partnerships with local companies and memberships in coalitions to further their sustainability and resilience goals.

Partnerships with local or regional coalitions support similar goals, although few hospitals participated in coalitions. A third of key informants discussed partnering with local government officials on climate action, city sustainability teams, state hospital association climate councils, and other organizations to work on similar goals. For example, many cities and states have renewable portfolio standards and renewable energy targets they are working toward. In some cases, multiple organizations banded together to aggregate their demand for energy through a renewable energy power purchasing agreement. Some key informants said that their hospitals joined with other organizations to use a bidding process for a renewable energy power purchase agreement. They believe that an aggregate demand made it much more appealing to developers to invest in building solar farms and other renewable energy projects in their region. While beneficial, two-thirds of survey respondents did not participate in any coalitions. Two key informants specifically cited time constraints and lack of bandwidth as barriers to participating actively in coalitions.

Essential hospitals commonly partner with waste management, governmental agencies, and renewable energy companies. Hospitals often partner with their local utility company to examine their energy usage and work to optimize and create efficiencies within their systems. Some key informants reported that their local utility provider offered to send a representative to their facility to examine their operations and make recommendations, which included how to make the facility more efficient through various changes and repairs, and other investments that would help optimize their energy use and save them money. Some of the utility providers offered financial incentives for making certain changes and upgrades. Many key informants discussed energy rebate programs and other incentives that helped them gather the up-front costs of installing energy efficient equipment or investing in other energy efficiency projects. These incentives often helped make the business case for investing in these projects.

In addition to partnerships with utility providers, one key informant discussed their experience providing feedback to supply manufacturers on a product they used widely across their buildings. The manufacturer took their concerns into consideration and created a better product, which improved the resilience of the facility.

“We have found one particular brand of retrofit kits that is head and shoulders above the rest. So we kind of partnered with them, and we had the opportunity to give them feedback. ... Since we’re a large customer of theirs, it’s a two-way street. I feel like they’re going the extra mile to make the product better for us, and we in turn, give them valuable feedback, and it’s working really well.” – *key informant*

A few hospitals affiliated with colleges and universities found value in partnering with existing campus sustainability teams. Some key informants were able to benefit from the existing knowledge and expertise their university sustainability teams have. This collaboration led to increased recycling and composting, consistent benchmarking, and consolidating waste streams under a single management system. In many cases, universities and health systems working toward their goals together builds their capacity to tackle new challenges.

“One of the important things about partnership is that together we keep each other abreast of any new regulatory changes, legal changes, or even the technologies that are coming up that might allow us to achieve our sustainability goals. For instance, the waste management company that we spoke of, by consolidating all those waste streams under one management system, we have a bit more control over it and there are cost efficiencies, etc. But more importantly, we’re able to learn that we could commingle certain waste or process them in a certain way that we didn’t know before because we’re working in silos and such.” – *key informant*

Some key informants benefited greatly from partnering with regulatory agencies. Extreme weather events can have a great impact on care delivery and the quality of services. Providing high-quality care and patient experience in the changing climate means hospitals also have a responsibility to build resilience to extreme weather events. Hospitals are faced with regulations from their county public health departments, the Centers for Medicare & Medicaid Services, the Joint Commission, and other entities. Some essential hospitals are working with their regulatory agencies to ensure that they comply with these regulations and create a safe environment for their patients and community. Key informants mentioned that seeing their regulatory agencies as a resource and partner has been a learning experience for them. The regulatory agencies audit the hospitals, run trials, and test new technologies so that when there are successes, they can be shared with other hospitals and health systems.

“We learn a lot of great things in terms of [partnering with] regulatory agencies. They work very closely with us because we don’t see them as regulators; we actually see them as our partners. We see them as people we learn from; so very frequently we stay in contact with them, and they audit us quite frequently. And every audit is a learning experience for us. ... They’re there to consult with us and tell us this is right, this is not right, or you’re misinterpreting a regulation correctly or not. ... They’ve actually allowed us to run trials and sort of be the testing ground for a lot of new technologies and new systems that hopefully can yield better opportunities for all, not just for us [our hospital system]. So that’s kind of engrained in our philosophy; we are a research and education facility, so we want to do a lot of research, and if we come back with something good, we want to share it with the world.” – *key informant*

Hospitals identified coalitions as valuable for learning from and for sharing best practices and accessing tools and information. Some of the coalitions hospitals most frequently cited were the American Society for Health Care Engineering (ASHE), American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), Practice Greenhealth, and other alliances and cohorts affiliated with Practice Greenhealth, such as the Healthier Hospitals Initiative. Almost half of key informants said these organizations provided resources that helped them advance their work. The resources informed or facilitated hospital sustainability practices, reduced energy consumption, identification of appropriate benchmarks, and enhanced understanding of areas for improvement.

Almost half of key informants participated in Practice Greenhealth, a health care membership organization that provides sustainability solutions. Members of Practice Greenhealth were able to learn about best practices in health care sustainability to guide their own improvement efforts in areas such as greenhouse gas emissions; energy, waste, and water; healthier food; transportation; healthier chemicals; and greening the operating room. Key informants involved with Practice Greenhealth and its parent organization, Health Care Without Harm, were involved in several cohorts and alliances within the organization, such as the Healthier Hospitals Initiative, the Alliance of Nurses for Healthy Environments, and the U.S. Health Care Climate Council.

“I found [the coalition] to be very useful because they do national benchmarking. It was easy to find out where the gaps are that we need to fill. It was a tremendous resource, to see what others are doing and where they are focusing. They also have public cost savings reports. This was the first time we actually were involved in the reporting process, so I am interested to see where we stand.” – *key informant*

Of the 17 hospitals interviewed, four mentioned their involvement with ASHE, a membership group of the American Hospital Association for professionals in health care engineering. Some key informants cited ASHE’s resources and networking opportunities

as an important facilitator of their work in reducing their facilities' energy usage. Many members of America's Essential Hospitals have been recognized as part of ASHE's Energy to Care Award, which recognizes health care facilities for significantly reducing their energy use.

“We do work with ASHE; they have a huge push dedicated to energy. They take a lot of pride in lowering the energy impact of hospitals worldwide ... They have a lot of resources dedicated to lowered energy usage in health care. You're involved with the leaders – guys that have been in the business for 30-plus years. So, if you run across something that you're unaware of, or about best practices, you have a resource of hundreds of other people who have already gone through it – this is what they did, this is what they learned. The networking has been the greatest benefit to working with ASHE.” – *key informant*

CASE STUDY

Identifying Best Practices from Coalitions: Denver Health and Hospital Authority

BACKGROUND: Denver Health comprises a 453-bed hospital, 10 community health centers, and 17 school-based clinics. Their mission and vision include being the healthiest community in the United States through improving clinical care and enhancing knowledge and practices through education and research.



DENVER HEALTH.
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FOR LIFE'S JOURNEY

Denver Health participates in several coalitions that help drive climate resilience and mitigation changes within their health system. Coalitions such as the Medical Society Consortium on Climate and Health, Practice Greenhealth, Health Care Without Harm, and the Healthier Hospitals Initiative expand the hospital's knowledge on climate-related issues and interventions to prepare for or implement change and to provide resources and assistance for implementation. In particular, the Healthier Hospitals Initiative has an annual conference, CleanMed, for leaders in health care sustainability. One of the presentations at CleanMed inspired Denver Health to work on a request for proposal (RFP) to secure a partner agreement to retrofit their buildings with LED lighting and other energy efficiency changes. Denver Health cited the cost of change as an obstacle: “One of the main problems we have is budget, and it's hard to get additional funding for large-scale projects.” Through CleanMed, Denver Health learned how to utilize the RFP process to pay for future activities; the current project to retrofit lighting with efficient lighting will pay for itself because of the cost savings.

Additionally, Denver Health used the RFP process to partner with local waste stream and recycling companies, saying “They are more willing to help with issues since they are local,” which creates a sense of community stewardship. Denver Health credits these coalitions and partnerships in spearheading their initiatives to tackle climate resiliency and climate mitigation. “I think it takes a small coalition of interested people with a large amount of extra time on their hands.”



CONCLUSION

As climate change increases the occurrence of storms and extreme weather, vulnerable populations will be the first to experience negative impacts. Vulnerable populations, often already living in areas with poor air quality and/or polluted water, will increasingly be more impacted by climate change and less resilient to its challenges.

Already, the urban areas that are hottest tend to be in low-income communities and, more often than not, in communities of color.^{xvii} In the future, people living in low-income counties will see more damage from climate change compared with more wealthy counties.^{xix} Essential hospitals serve communities with higher rates of poverty, racial and ethnic minorities, and individuals with complex clinical needs. In addition, many of these communities include people with housing insecurity and food insecurity, heightening the likelihood of health problems. Essential hospitals are connected to the well-being of the people and communities they serve. This connection extends beyond the simple treatment of illness and disease into the social and environmental factors that influence health.

Essential hospitals and health systems—those that treat a large proportion of vulnerable patients—are in a unique position to drive population health improvements. These hospitals occupy central positions within their community as main providers of care, large employers, and sources of community resources. Their experience caring for complex patients with needs that go beyond medical care gives essential hospitals a deep understanding of their community’s needs. Thus, essential hospitals also require special considerations when it comes to costly infrastructure changes to improve their resilience to climate change. Resource constraints, regulations, and severe weather events complicate those changes. Essential hospitals, on average, operate with little or no margin, affecting their ability to fund practices that mitigate climate change or build climate resilience.^{xx} The findings from this project identified five key recommendations for policymakers and funders:

- 1 Educate leadership and governance.** Target increased awareness about building climate resiliency and the link between climate and health at the hospital leadership level. Leadership is key for uptake and funding of new practices and technology. Leaders identified a need to see the link between climate and health. At the same time, hospital staff reported how leadership ultimately made the decisions to implement practices that support sustainability. Because hospital governing boards provide guidance and contribute to the organization’s strategic vision, it will be important also to raise their awareness of the health impacts of climate change.
- 2 Set goals for sustainability and resilience practices.** Identify measurement tools and set targets for sustainability and resilience practices. Goal setting is critical to driving change and prioritizing next steps. Most essential hospitals were monitoring energy usage and, to a degree, water and waste, but few set specific targets. Many hospitals reported that monitoring was not specific enough to identify what aspects of their hospital were the most wasteful. For the few hospitals that set goals, they were

comprehensive and far-reaching, such as including targets for electricity, water, and waste.

- 3 Invest in climate resilience and sustainability.** Invest in practices that build climate resilience and mitigate climate change. Many member hospitals are investing in climate resilience practices; however, it takes substantial finances to make changes that would have a significant and lasting impact. In some cases, hospitals have used sustainable practices when designing a new building or substantially refurbishing an older building. In other cases, hospitals received additional outlays, such as a grant, bond, or federal funding to resist or prevent a potential health threat such as a specific influenza outbreak.
- 4 Identify practices with immediate return on investment.** Identify concrete climate resilience practices that will bring immediate return on investment. Some hospitals implemented practices to build climate resilience and mitigate climate change because of regulatory requirements or because of a severe weather event. However, a major reason for change was improved operational efficiency that led to cost savings. Hospitals valued practices with a return on investment, not just because it saved money, but also because those savings could be used for patient care. In some cases, savings also enabled them to fund additional practices that supported sustainability.
- 5 Promote coalitions and partnerships.** Promote the value of coalitions and local partnerships in identifying promising practices and setting goals. A minority of hospitals participated in coalitions, yet many participated in local partnerships with waste companies and utility companies. Coalitions were critical because many staff did not have internal expertise but were able to obtain promising practices, identify measurement tools, and, in a few places, collaborate to purchase renewable resources. Waste and utility companies assisted hospitals by identifying methods to reduce waste.

Appendix I:

METHODS



This project used a sequential explanatory mixed methods approach to explore what essential hospitals are doing to build climate resilience, mitigate climate change, and engage the community and other key stakeholders. The goal of the research was to develop recommendations about future policy decisions as well as future funding endeavors. Overall, the project was guided by the following research questions:

1. To what extent, and in what ways, are essential hospitals working toward adopting practices related to climate resilience?
 - a. What measures are they undertaking to alter operational practices that contribute to the reduction of air pollutants and solid waste in communities?
 - b. How are hospitals engaging communities most vulnerable to climate impacts?
 - c. What are the critical leverage points for those hospitals to take more action on climate resilience?
 - d. What emerging promising practices exist?
2. What economic, regulatory, technological, and organizational challenges do hospitals face in implementing practices to reduce adverse impacts on the environment and environmental impacts on low-income communities?
3. What opportunities are there for essential hospitals to engage in climate resilience efforts within existing programs or infrastructure (e.g., opportunities to embed smart-climate assessment as part of ongoing Community Health Needs Assessments, local/regional climate action plans, current community engagement)?
4. What lessons can be drawn for funders, policymakers, and the field at large?

The relevant literature was reviewed to better understand what activities essential hospitals were adopting to build climate resilience and mitigate climate change. The findings then informed the creation of a web-based survey to better identify what steps essential hospitals were taking or planning to take, as well as identify the reasons for doing so. This survey was sent to hospitals and health systems that are members of America's Essential Hospitals. Then, for a subset of the hospitals that responded, in-depth interviews were conducted to gain insights into the reasoning for answers. In addition, a meeting with many leaders of essential hospitals was held at America's Essential Hospitals' annual conference in June 2019 to ascertain motivators and challenges to funding practices that build climate resilience.

Overview of Methods



TASK 1: SURVEY

Scan literature ► Survey essential hospitals ► Identify member activities related to climate resiliency



TASK 2: INTERVIEWS

Identify participants ► Develop interview guide ► Conduct interviews
► Determine in-depth reasons for activities



TASK 3: MEMBER FORUM

Invite participants from annual meeting ► Facilitate dialogue between member representatives regarding motivations and funding



TASK 4: CASE STUDIES

Analyze data that emphasize promising practices and insights



TASK 5: WHITE PAPER

Describe findings ► Present recommendations for policymakers and funders to maximize their impact

SURVEY

The first data collection activity for this research project was to field a survey to America's Essential Hospitals' member hospitals to gain a broad sense of how essential hospitals are mitigating their contribution to climate change and building resilience to the changing climate within their communities.

To develop the survey the Institute conducted an environmental scan seeking to identify environmental sustainability practices in health care and the types of practices hospitals are using to enhance sustainability. Based on this scan, and in collaboration with the client, the Institute drafted a survey. Before fielding the survey with members, the Institute conducted usability testing to collect feedback on the survey's usability and to pilot test the online format.

The survey was conducted between March 2019 and August 2019. The Institute successfully identified 61 contacts, which accounts for 55 percent of member hospitals. Contacts received a prelaunch email, launch email, and several reminder emails to

complete the survey. A total of 34 individuals responded to the survey, resulting in a 56 percent response rate among hospitals that successfully received the survey. This represents 32 percent of America's Essential Hospitals membership.

KEY INFORMANT INTERVIEWS

The second data collection activity was to conduct key informant interviews with a subset of survey respondents. A semistructured key informant protocol was developed that asked survey respondents to describe practices that mitigate climate change; build resilience; and engage communities, coalitions, and partners and the reasons for doing so.

The Institute conducted interviews between May 2019 and August 2019. After the survey had been sent to the hospitals, we then contacted hospitals with which we had a contact within their facilities or support services department. We conducted 17 interviews, mostly with a single individual, but in some cases, two to three individuals. For participants who had not responded to the survey, we also asked them to respond to the survey. A trained interviewer and note taker conducted each interview each taking approximately one-hour. All interviews were recorded. Interview notes were reviewed and cleaned and autocoded using the research software program NVivo. Researchers read all data and identified themes from the data.

Based on the key informant interviews, case studies were developed. We included hospitals that we interviewed with and whose representatives provided descriptions of key activities related to the recommendations. We excluded hospitals that were well publicized regarding their activities to mitigate climate change.

MEMBER FORUM

The third data collection activity was through a forum conducted at America's Essential Hospitals annual conference. Attendees were invited to a one-hour discussion on climate change. The audience at the annual conference includes presidents, chief executive officers, chief financial officers, chief medical officers, directors, and others from hospitals and health systems who seek to discuss issues that impact their vulnerable patients and communities. During the member forum, participants discussed two areas of concern: motivations and barriers hospitals face in investing in sustainability and climate resilience and how funding decisions are prioritized and influence climate mitigation and resilience-related initiatives within their hospital.

DESCRIPTION OF PARTICIPANTS

Survey respondents had varying titles and job responsibilities, including sustainability director, energy and sustainability coordinator, manager/vice president of facilities and support services, and vice president of operations. Survey respondents represented a variety of essential hospitals as well: majority urban; slightly less than half were private nonprofit; slightly more than half were owned by a hospital authority or local or state government; slightly less than a third had fewer than 100 beds, equal numbers had 100 to fewer than 400 beds, and 300 to fewer than 500 beds, and more than a quarter had 500 beds or more.

Key informants had varying titles and job responsibilities, ranging from coordinators to vice presidents, but most commonly represented were directors and managers focused on sustainability, facilities, and support services. Interview participants represented diverse organizations. Approximately a third were not-for-profit hospital organizations, while the rest were owned by a local or state government or a hospital authority. Most of the key informants came from hospitals with more than 500 beds, and there were no key informants from hospitals with fewer than 100 beds. A couple of participants came from smaller hospitals with 100 to 299 beds, and a few others came from midsize hospitals with 300 to 499 beds.

Fifty-eight people signed up for the forum, and close to 60 attended. Registrants represented presidents, vice presidents, chief executive officers, medical officers, directors of nursing, board members of hospitals, funders, and other hospital representatives in leadership positions.

LIMITATIONS

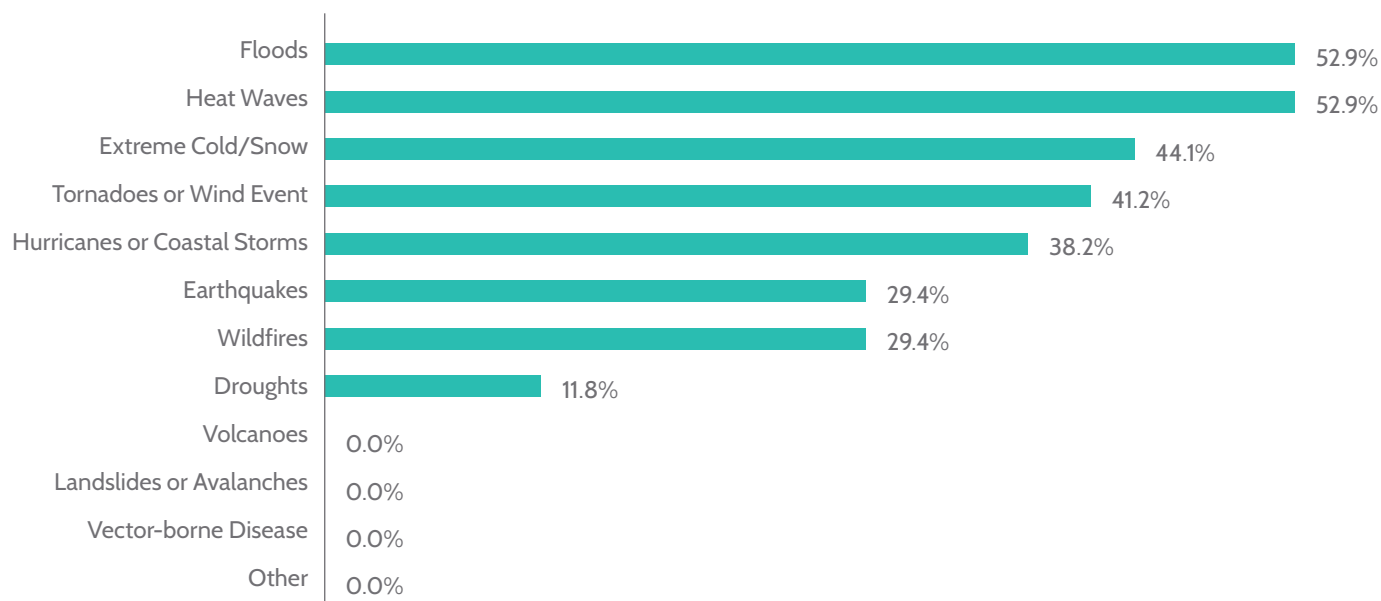
Time limitations, as well as the scope of the project, limited research staff from exploring every discussion related to this topic. In lieu of these limitations, a structured methodological approach was used to maximize the amount and quality of information that could be collected given a restricted time frame.

Appendix II: SURVEY RESULTS

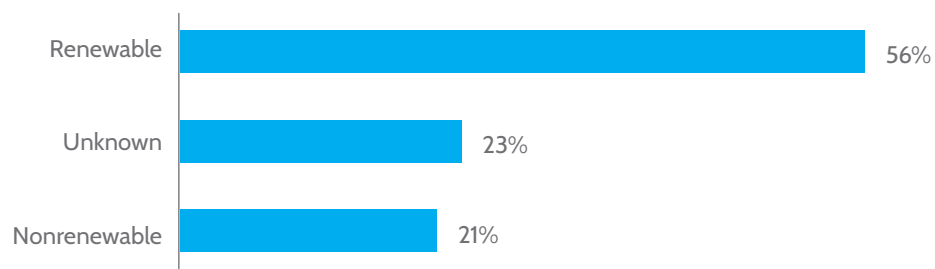


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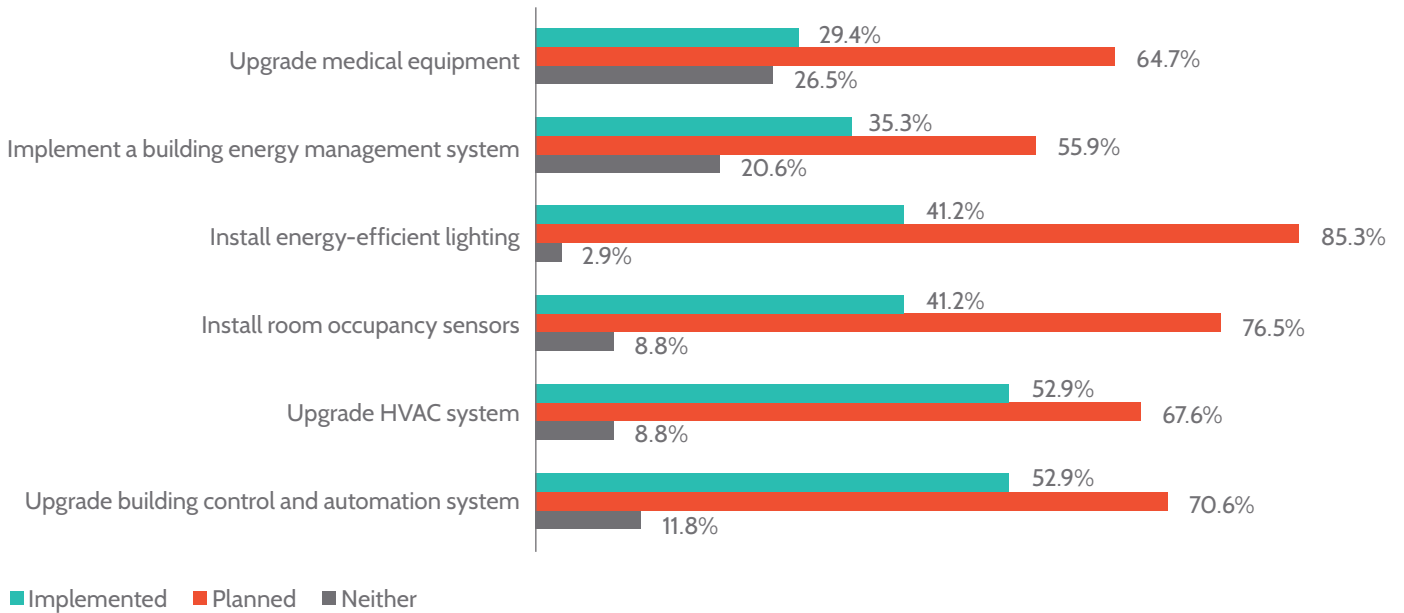
1. PLEASE SELECT THE TOP 3 EXTREME WEATHER EVENTS ACCORDING TO THE LEVEL OF RISK THEY POSE TO YOUR COMMUNITY.



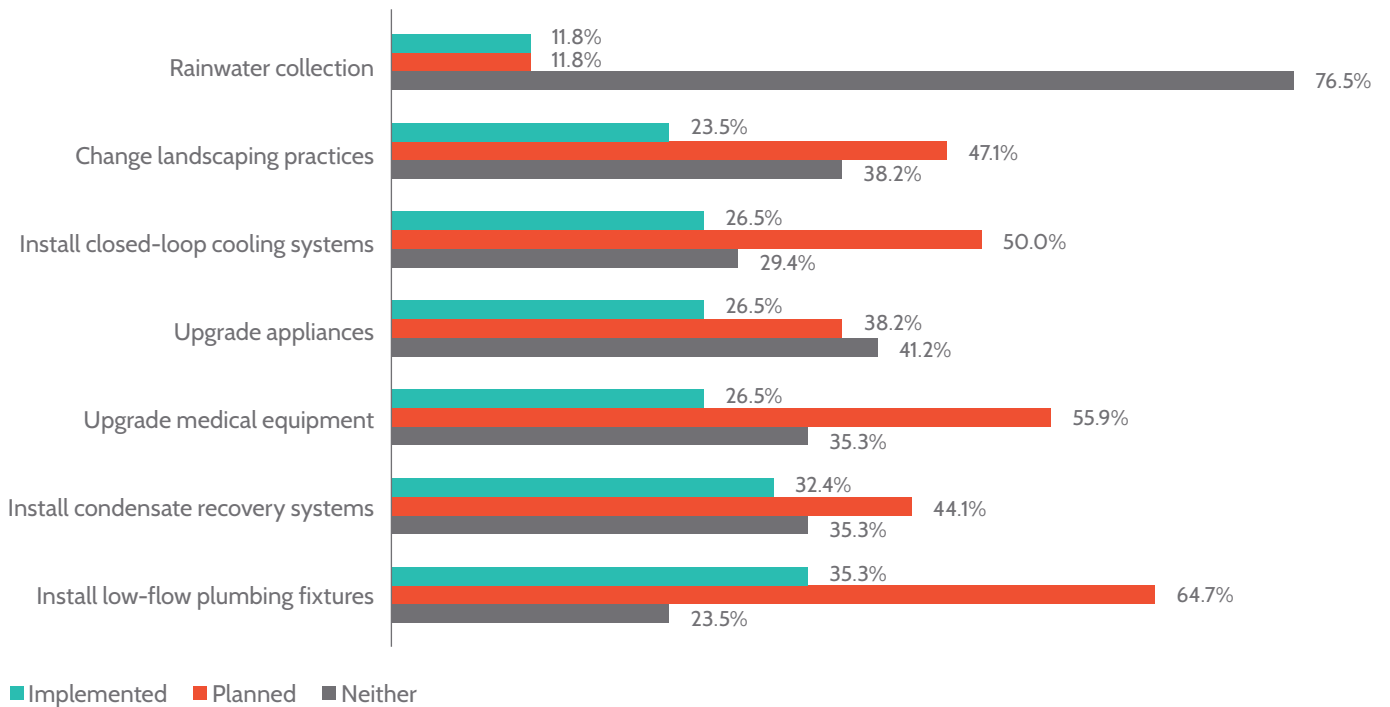
2. WHAT PERCENTAGE OF YOUR HOSPITAL'S TOTAL ENERGY NEEDS ARE MET BY THE FOLLOWING SOURCES?



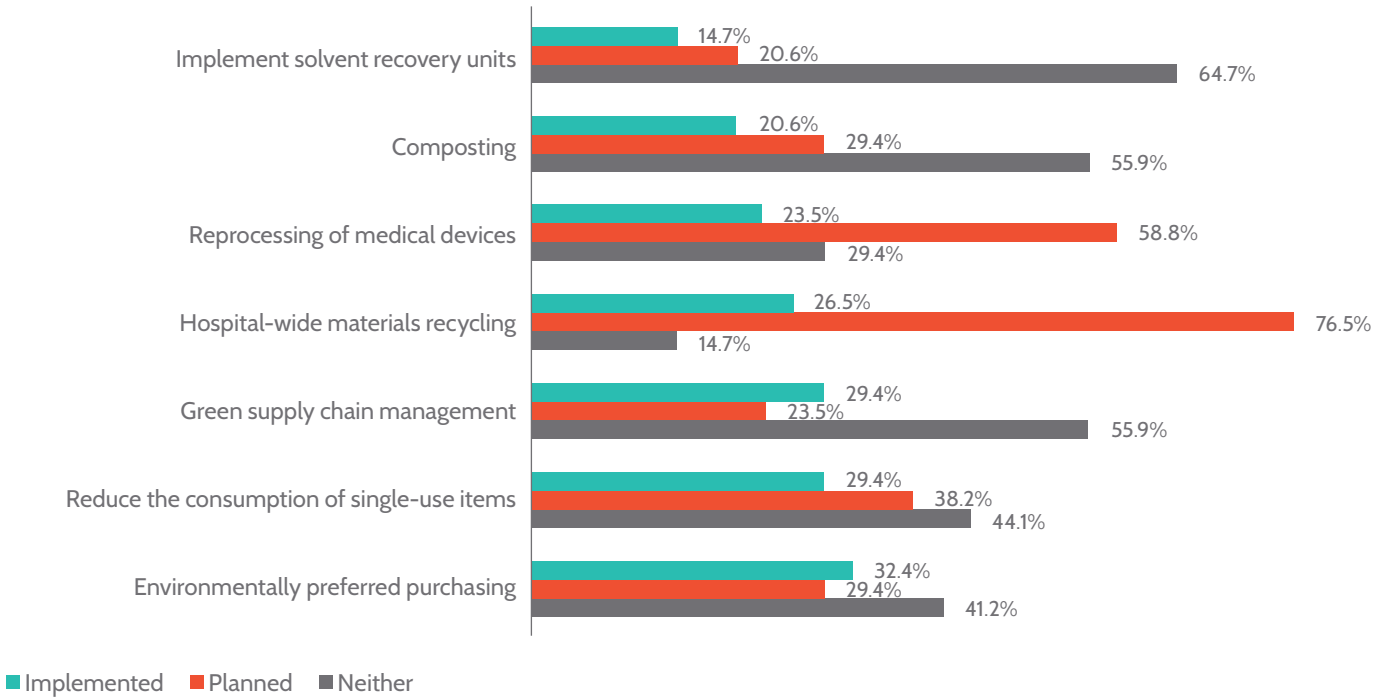
3. HAS YOUR HOSPITAL IMPLEMENTED OR PLANNED ANY OF THE FOLLOWING TO REDUCE ENERGY USE? (CHECK ALL THAT APPLY)



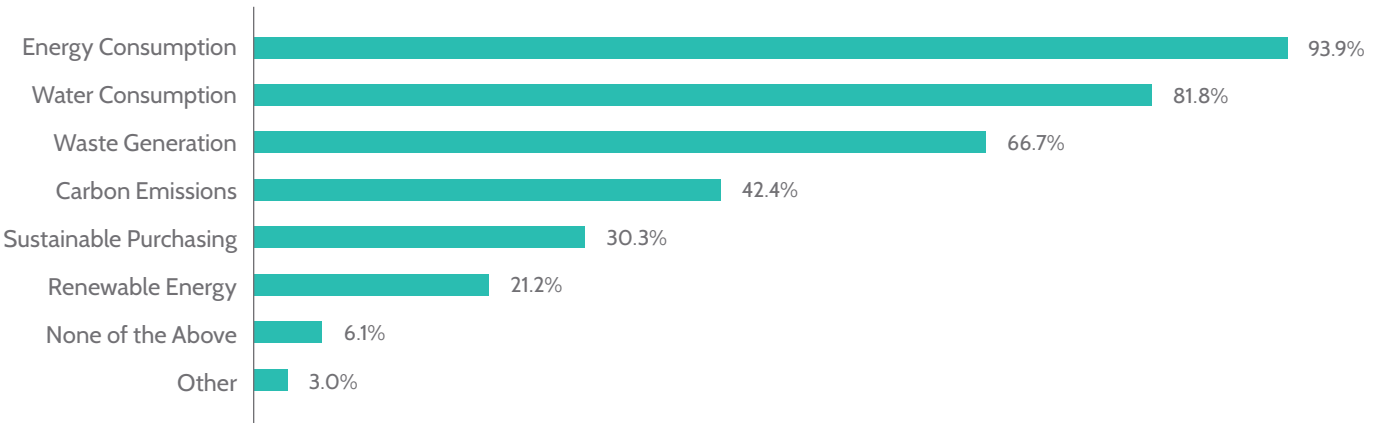
4. HAS YOUR HOSPITAL IMPLEMENTED OR PLANNED ANY OF THE FOLLOWING TO REDUCE WATER USE? (CHECK ALL THAT APPLY)



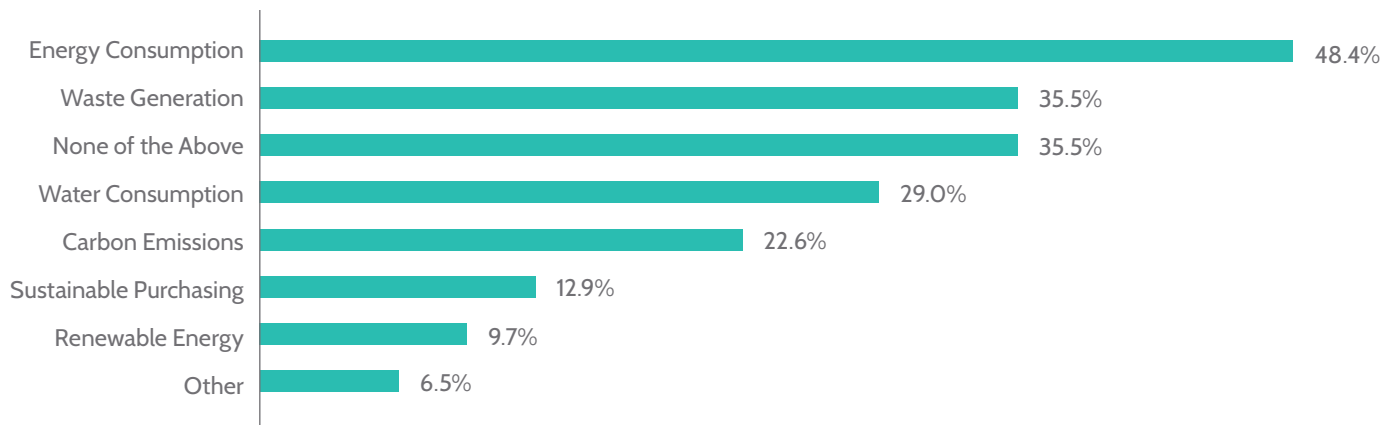
5. HAS YOUR HOSPITAL IMPLEMENTED OR PLANNED ANY OF THE FOLLOWING TO REDUCE SOLID WASTE? (CHECK ALL THAT APPLY)



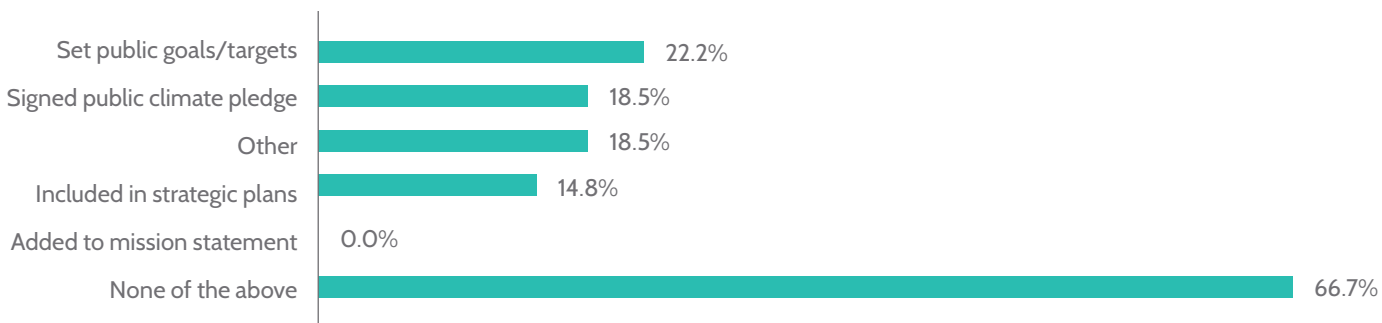
6. DOES YOUR HOSPITAL ACTIVELY MONITOR THE FOLLOWING? (CHECK ALL THAT APPLY)



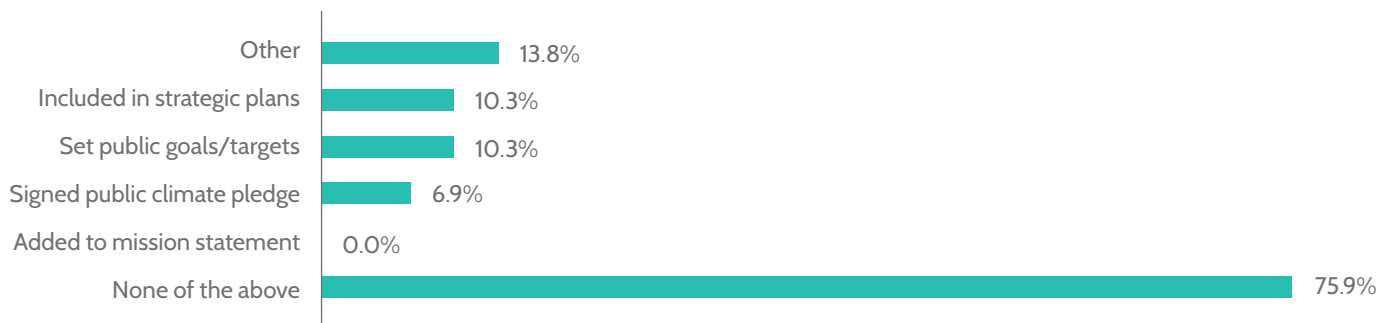
7. HAS YOUR HOSPITAL SET PERFORMANCE TARGETS FOR THE FOLLOWING? (CHECK ALL THAT APPLY)



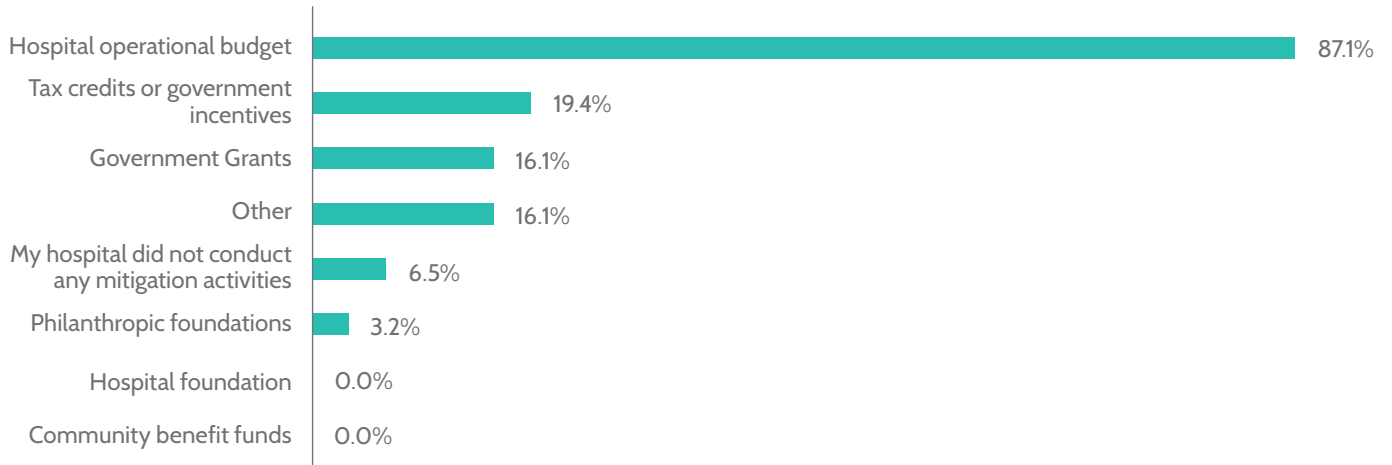
8. HAS YOUR HOSPITAL MADE FORMAL COMMITMENTS RELATED TO CLIMATE CHANGE MITIGATION? (CHECK ALL THAT APPLY)



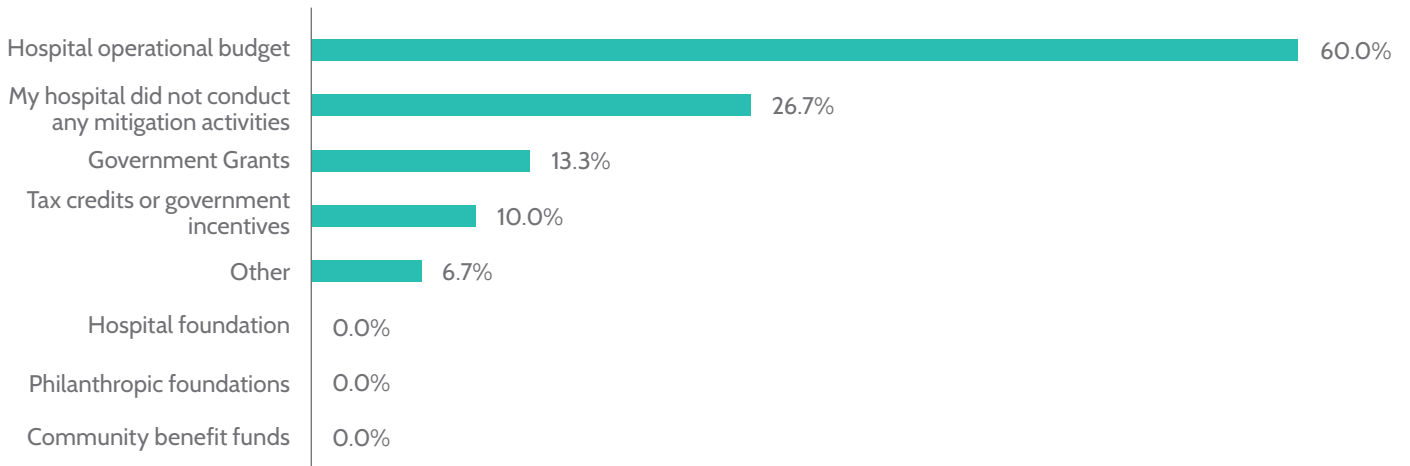
9. HAS YOUR HOSPITAL MADE FORMAL COMMITMENTS RELATED TO CLIMATE RESILIENCE? (CHECK ALL THAT APPLY)



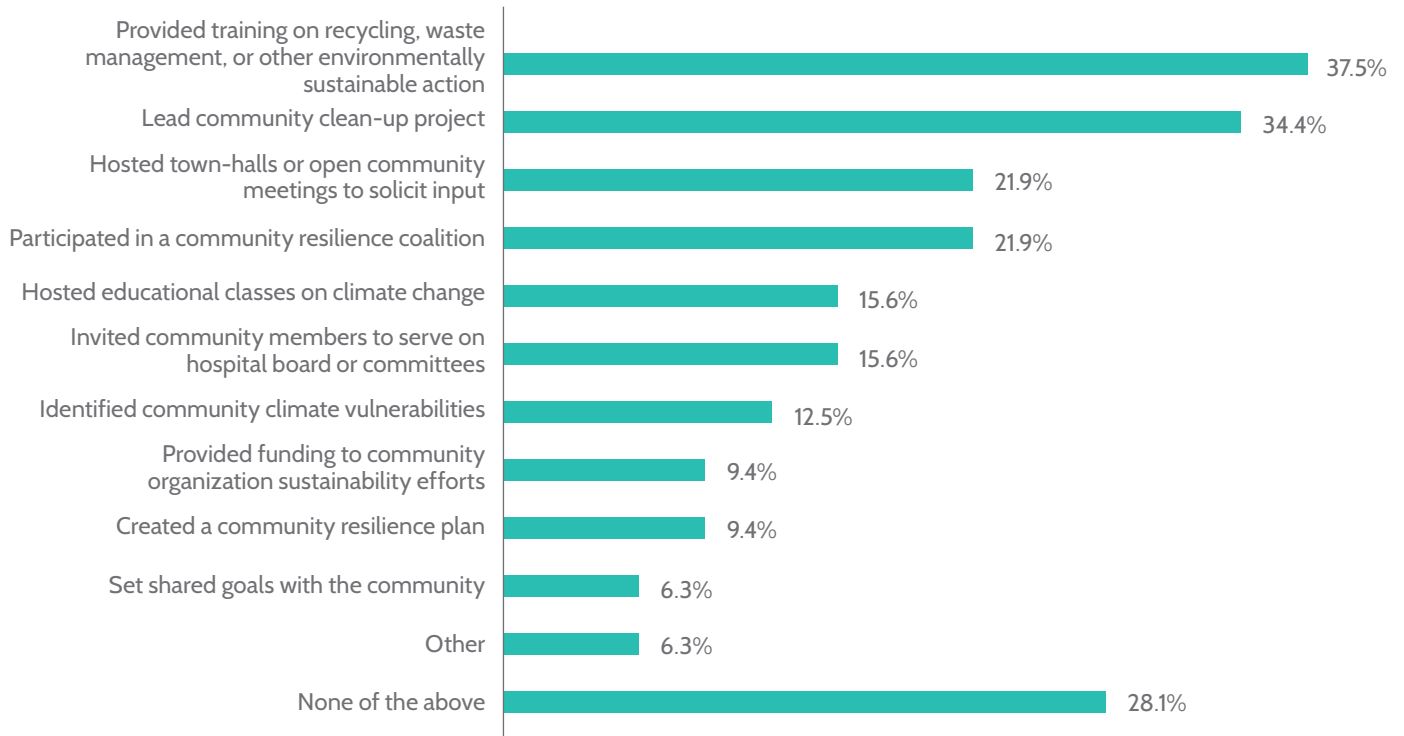
10. WITHIN THE LAST 3 YEARS, HOW WERE YOUR HOSPITAL'S CLIMATE CHANGE MITIGATION ACTIVITIES FUNDED? (CHECK ALL THAT APPLY)



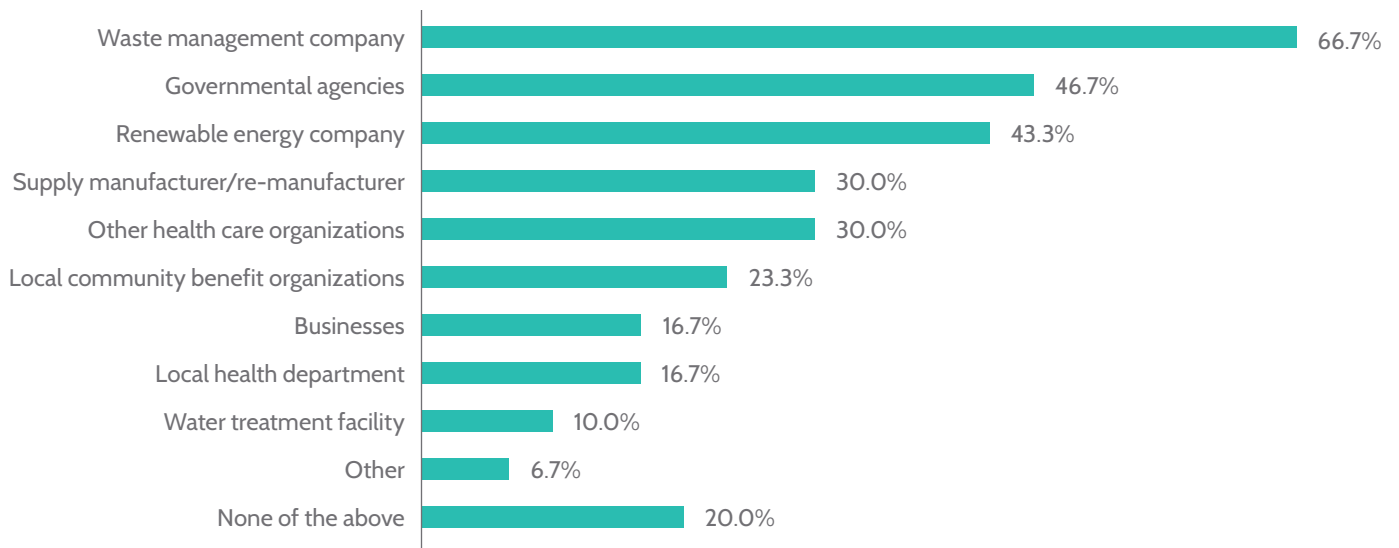
11. WITHIN THE LAST 3 YEARS, HOW WERE YOUR HOSPITAL'S CLIMATE RESILIENCE ACTIVITIES FUNDED? (CHECK ALL THAT APPLY)



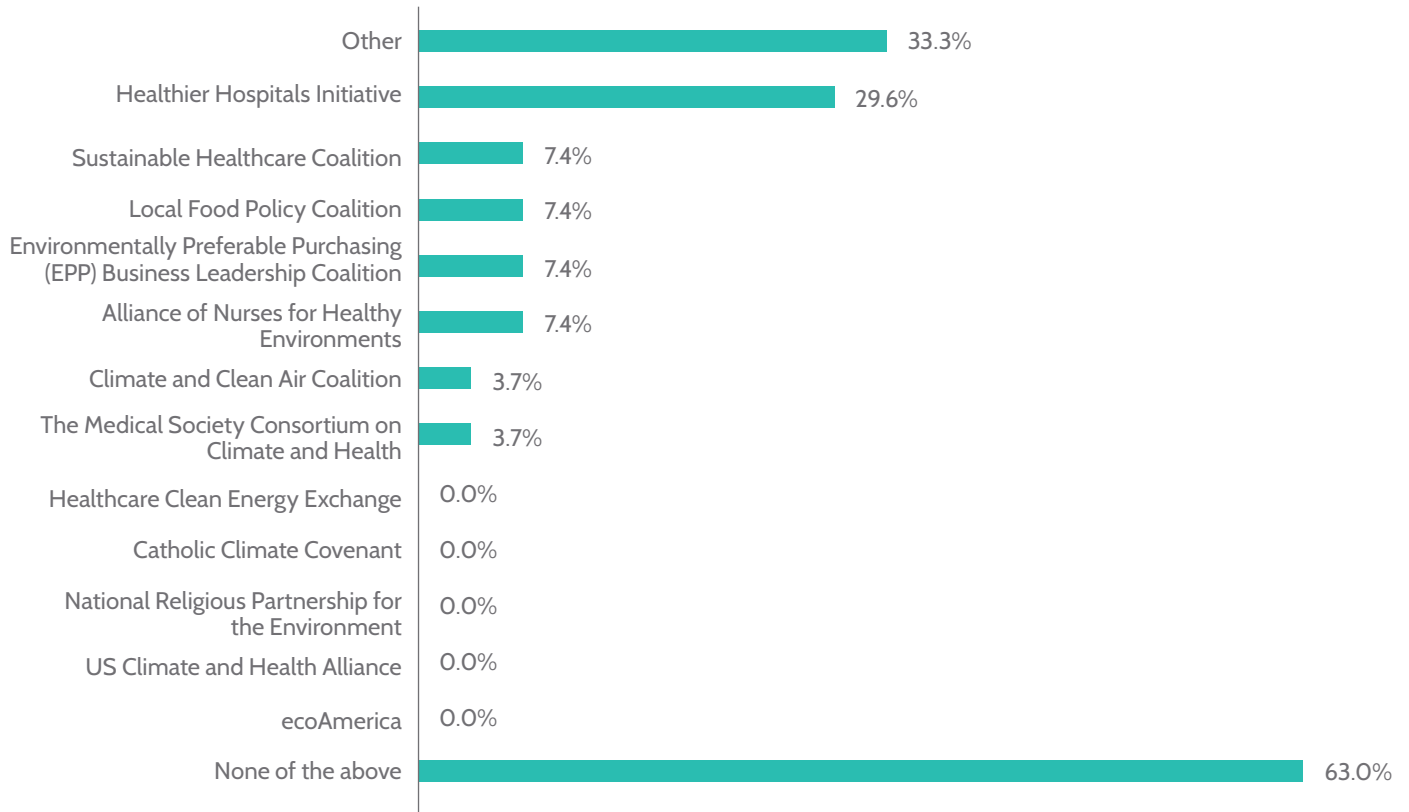
12. WITHIN THE LAST 3 YEARS, IN WHICH OF THE FOLLOWING WAYS HAS YOUR HOSPITAL ENGAGED YOUR COMMUNITY IN ENVIRONMENTAL ISSUES? (CHECK ALL THAT APPLY)



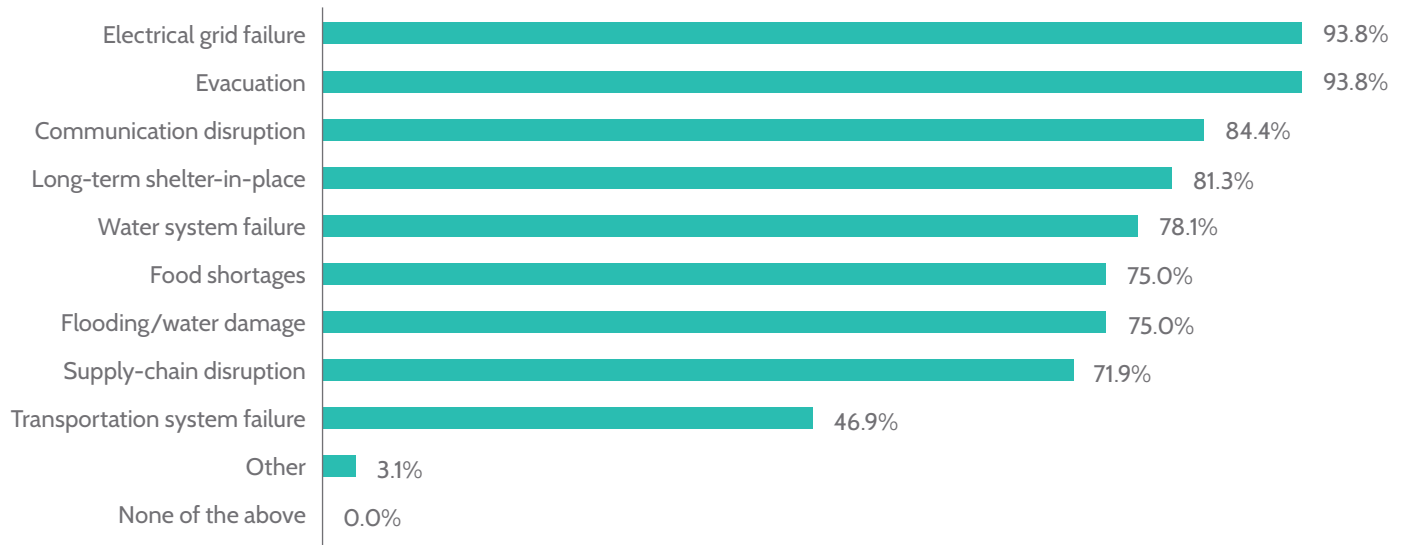
13. WITHIN THE LAST 3 YEARS, HAS YOUR HOSPITAL ENGAGED ANY OF THE FOLLOWING PARTNERS TO ACHIEVE CLIMATE CHANGE MITIGATION AND/OR RESILIENCE? (CHECK ALL THAT APPLY)



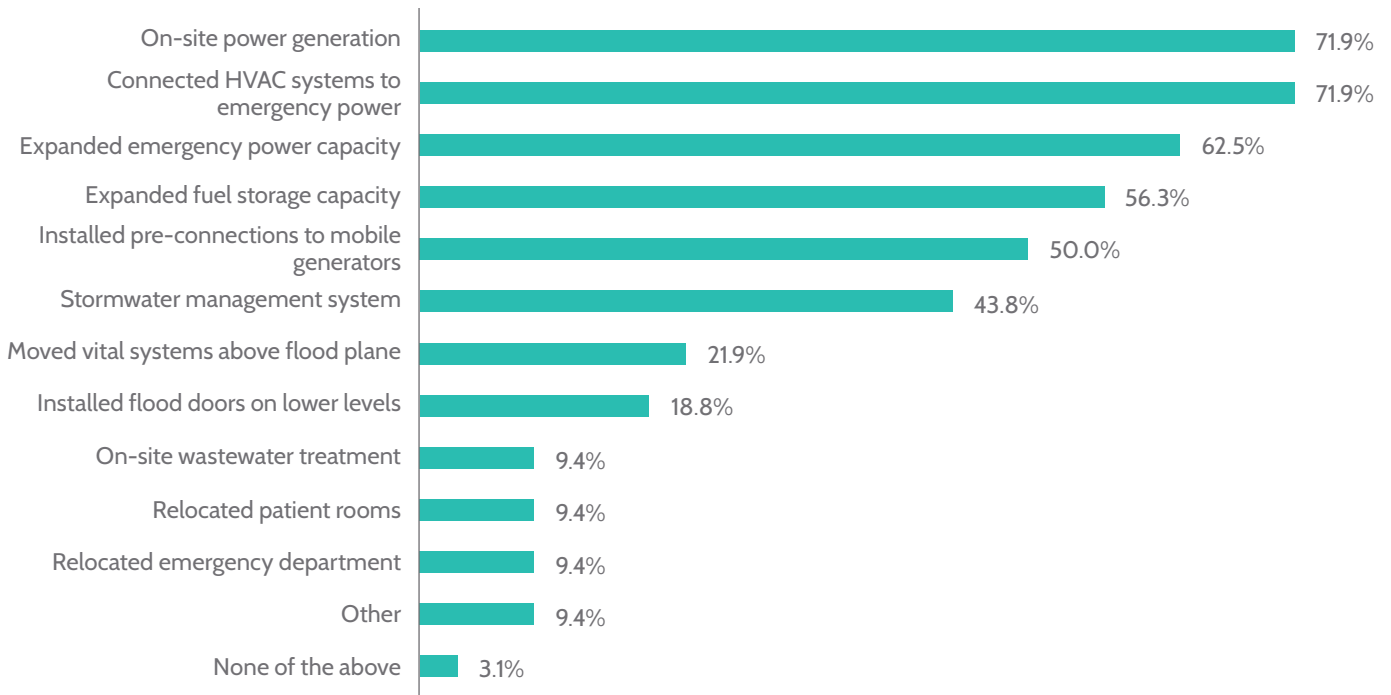
14. DOES YOUR HOSPITAL PARTICIPATE IN ANY OF THE FOLLOWING COALITIONS? (CHECK ALL THAT APPLY)



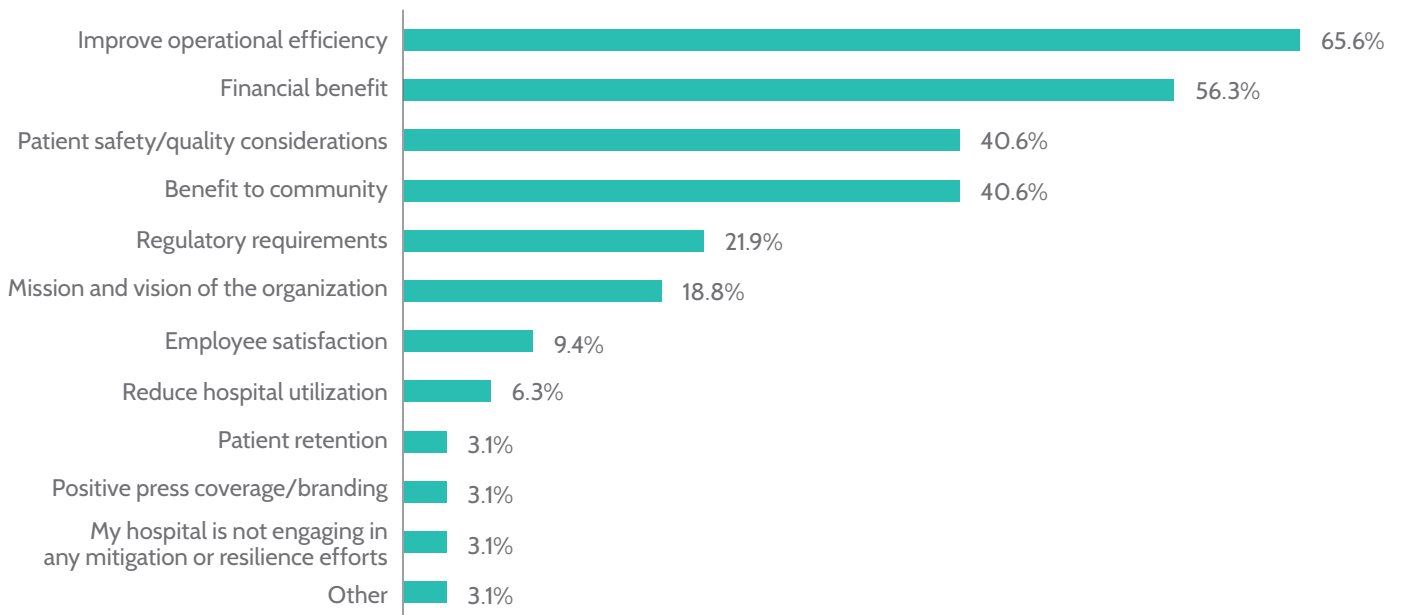
15. DOES YOUR HOSPITAL HAVE A PLAN IN PLACE TO PREPARE FOR THE FOLLOWING IMPACTS RESULTING FROM AN EXTREME WEATHER EVENT? (CHECK ALL THAT APPLY)



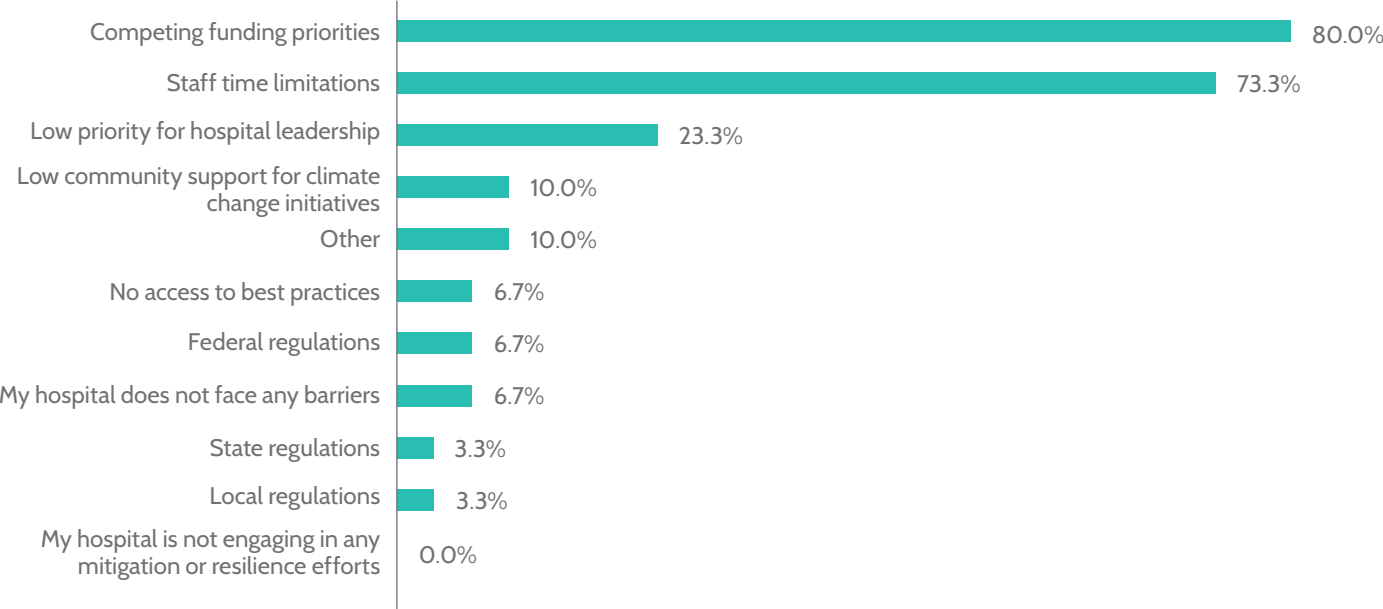
16. WHAT FACILITY-LEVEL INFRASTRUCTURE ELEMENTS HAVE BEEN IMPLEMENTED AT YOUR HOSPITAL TO INCREASE ITS RESILIENCE TO EXTREME WEATHER EVENTS? (CHECK ALL THAT APPLY)



17. WHAT ARE THE PRIMARY MOTIVATORS FOR YOUR ORGANIZATION TO ENGAGE IN CLIMATE CHANGE MITIGATION AND/OR RESILIENCE EFFORTS? (PLEASE SELECT UP TO 3)



18. WHAT CHALLENGES DOES YOUR ORGANIZATION FACE IMPLEMENTING CLIMATE CHANGE MITIGATION AND/OR RESILIENCE INITIATIVES? (PLEASE SELECT UP TO 3)



Appendix III: INTERVIEW TOPIC GUIDE



KRESGE CLIMATE RESILIENCE INTERVIEWS TOPIC GUIDE

This document outlines the topics covered in the key informant interviews.

1. **Introductions.**
2. **Experiences with climate mitigation activities.** Description of:
 - a. one to two recent activities conducted or in the process of being implemented;
 - b. reasons for implementation;
 - c. decision-maker and decision-making process; and
 - d. effect on the system.
3. **Experiences with climate resilience activities.** Description of:
 - a. one to two recent activities conducted or in the process of being implemented;
 - b. reasons for implementation;
 - c. decision-maker and decision-making process; and
 - d. effect on the system.
4. **Facilitators and barriers.** Description of the facilitators and barriers in performing the climate mitigation and climate resilience activities.
5. **Community engagement.** Description of:
 - a. one to two recent activities conducted or in the process of being implemented;
 - b. reasons for engagement;
 - c. decision-maker and decision-making process; and
 - d. effect on the system.
6. **Partnering with organizations.** Description of:
 - a. one to two recent activities conducted or in the process of being implemented;
 - b. reasons for participation;
 - c. decision-maker and decision-making process; and
 - d. effect on the system.
7. **Participating in coalitions.** Description of:
 - a. one to two recent activities conducted or in the process of being implemented;
 - b. reasons for participation;
 - c. decision-maker and decision-making process; and
 - d. effect on the system.

Appendix IV: REFERENCES



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