HEALTH CARE AND THE CLIMATE CRISIS: PREPARING AMERICA'S HEALTH CARE INFRASTRUCTURE

V. Methodology, Limitations, and Supplemental Tables

This is the fifth part of a Majority Staff Report focused on the U.S. health system and the climate crisis. Part One provides an overview of the problem, description of Chair Neal's 2022 Request for Information (RFI), and summary statistics. Part Two examines how the climate crisis and the prevalence of extreme weather events impact health care organizations – and what they are doing to respond and prepare for future events. Part Three describes how health care organizations are assessing their climate impact and working to reduce their respective carbon footprints. Part Four summarizes findings and provides a discussion of implications.

On March 24, 2022, House Ways and Means Committee Chair Richard E. Neal called on 14 leading health systems to partner with the Ways and Means Committee to address the impacts of the health care sector on the climate crisis through a Request for Information (RFI).[1] This request was expanded on April 1, 2022, to two national dialysis companies and 10 trade associations with facility-based health providers.[2] Letters released to the health care sector's trade associations included a further request that they solicit feedback from a sample of their members. Chair Neal sent a third round of surveys to the nation's three leading group purchasing organizations (GPOs) on July 29, 2022, to solicit feedback on how they use their position and contracting prowess to reduce the impact of the health care supply chain on the climate crisis (results from the GPO survey will be presented separately in forthcoming Parts).

SURVEY DEVELOPMENT AND DESIGN

Ways and Means staff created three surveys: The first went to climate innovators and the sample of providers identified by trade association members, the second went to trade associations themselves, and the third went to GPOs. Each survey was tailored to reflect the perspectives of the intended audience, and questions were created through an online tool (Survey Monkey). Survey questions probed on the key research questions of the project: 1) How are climate-related extreme weather events affecting health care organizations' operations? And 2) how are health care organizations addressing their environmental impacts (e.g., carbon emissions)? RFI respondents are listed on the Ways and Means website at [insert link].

Staff created the survey based on a review of the extant literature, expert input, and discussions with a sampling of providers already engaged in climate-related activities. Questions drilled down on the following topics: 1) The impact of the climate crisis on health care organizations, 2) the attention and resources that the health care sector have employed, if

[1] The original RFI only included 12 organizations; subsequently, staff learned about two additional large health systems that had equivalent experience managing and addressing climate-related issues. Staff determined these additional organizations belonged in the first batch of surveyed providers and added them to the original 12 to make 14 "climate innovators."
[2] Three additional trade associations submitted unsolicited responses to the survey, which were incorporated to make 13 total responses.

applicable, to address climate crisis issues, 3) barriers health care organizations were encountering when taking action to address the climate crisis, and 4) potential solutions.

The survey design process involved: 1) identifying overarching domains related to the broad research questions; 2) developing questions for each domain; 3) organizing questions based on the role of health care organizations with regard to the climate crisis; 4) formatting questions into multiple choice, Likert-scale, or open response questions when appropriate; 5) creating an option for organizations to provide their own climate tracking data and climate action plans through an upload option; 6) applying skip logic on survey questions to lead respondents to appropriate follow-up questions to streamline answers; 7) performing multiple survey audits to eliminate errors; and 8) soliciting feedback from multiple stakeholders and content-area experts to ensure appropriateness of research and survey questions.

DATA COLLECTION AND RESPONSE

The Ways and Means staff began by identifying a sample of health care organizations that were leaders in addressing the climate crisis through stakeholder, government, and health care provider networks. An initial sample of 14 early adopters deemed "climate innovators" were contacted directly to complete the survey. In addition, the Ways and Means staff requested support from 10 trade associations to solicit responses from their member health care organizations. The final sample for the health care organizations surveyed included 76 respondents (14 climate innovators, 49 providers, and 13 trade associations).

ANALYSIS

Staff downloaded all relevant responses into a database and created an Excel-based analysis matrix for summarizing and analyzing results, excluding any incomplete surveys from the matrix at that time. The database was arrayed by survey question and, thus, captured both quantitative elements of respondents (e.g., type of organization, location) and qualitative responses (i.e., narrative responses to the RFI questions). The analytic tool mapped to the questions in the RFI to facilitate cross-respondent analyses. One staff member culled each RFI response, inputting the summaries into the Excel database to create an analytic file. Unique variable names were assigned for importing into Stata 15.0.

a. Qualitative analysis

Six independent reviewers from the Ways and Means staff examined different portions of the open-ended qualitative responses of the survey simultaneously, inputting results into the analytic file. The research team held daily meetings for a period of eight work weeks to discuss and confirm the validity of interpretations in responses. Qualitative findings were then used to create new variables for quantitative analysis, based on the frequency of themes that were identified by respondents. In addition to the individual-level analysis, reviewers analyzed findings in the aggregate by grouping categories of questions and cataloguing emergent themes.

b. Quantitative analysis

One analyst imported the quantitative data elements (i.e., questions that were not open-ended) into Stata 15.0 for analysis. The following describes the variables included:

- *Climate innovator vs. provider*. A total of 14 climate innovators were identified as health care entities that have adopted practices to address the climate crisis. These entities were compared against 49 other providers.
- *Organization type*. Respondents were grouped into four main organization types: Multi-hospital health system (n = 17), health system (n = 12), community health center (n = 26), and other (n = 7; includes multi-facility dialysis companies, nursing home corporations, and other health care entities). Although community health centers as an organization type were not initially included as a category in the RFI, many respondents answered in the open-response question that they were, in fact, community health centers, including federally qualified health centers. Given the number of community health centers that filled out the survey, staff determined it appropriate to make community health centers its own provider category for the purposes of analysis.
- *Facility type*. Respondents reported that they belonged to the following types of organizations (these categories are not mutually exclusive, and many organizations operated multiple facility types): Urban hospital (n = 26), rural hospital (n = 16), teaching hospital (n = 28), disproportionate share hospital (n = 19), specialty hospital (n = 10), critical access hospital (n = 10), long-term care facility (n = 18), skilled nursing facility (n = 14), and dialysis center (n = 10).
- *Region of operation*. Respondents reported that they maintained operations in the following regions (these categories are not mutually exclusive, and many organizations operated in multiple regions): New England (n = 6), Mid-Atlantic (n = 8), East North Central (n = 13), West North Central (n = 10), South Atlantic (n = 23), East South Central (n = 5), West South Central (n = 10), Mountain (n = 14), Pacific (n = 16), U.S. Territories (n = 4), and outside the U.S. (n = 5).
- *Ownership type*. Respondents reported the following ownership types: For-profit (n = 8), government-owned (n = 5), and non-profit (n = 50).
- *Climate events*. Respondents reported the number of climate events they experienced in the past five years. This variable was also recoded to examine: 1) Whether they experienced any climate event in the past five years ,and 2) whether they experienced five or more climate event in the past five years.
- *Dedicated resources to address climate crisis*. Respondents reported: 1) Whether they dedicated some resources to address the climate crisis, 2) have standing agenda items at board-level meetings, 3) have executive-level working groups, 4) have dedicated staff to address the climate crisis, 5) have climate action or preparedness plan (CAPP), and 6) used at least one tool to track carbon emissions.
- *Sustainability goals*. Respondents reported whether they: 1) Have internal sustainability goals as defined by President Biden's initiative to address climate change, and 2) have sustainability goals that are public.
- *Use of programs to address the climate*. Respondents reported whether they: 1) Used federal programs to reduce their organization's carbon footprint and 2) used employee work incentives to reduce their organization's carbon footprint.

Staff conducted bivariate analyses to examine associations among climate innovator vs. provider, organization type, and ownership type with outcomes related to climate preparedness and organizational climate structure. Pearson's Chi-square and Fisher's exact tests were performed on categorical outcomes, and Kruskal-Wallis tests were used for ordinal-level outcomes.

LIMITATIONS

This study included several key limitations that ought to be noted. First, because responses to the survey were voluntary, there is likely some level of selection bias. Staff attempted to ensure the survey had as broad a reach as possible by soliciting the assistance of trade associations representing more than 25,000 health care facilities nationally, but anecdotal feedback suggested that respondents were more likely to be facilities that either believed they had initiatives to share with the Committee or facilities that had experienced the negative ramifications of extreme weather events firsthand. Some providers told the Committee they were not interested in participating for a variety of reasons, most having to do with their lack of previous focus on climate-related issues. For this reason, it is likely the case the responses are skewed toward providers interested in engaging on climate issues (though some of that was intentional, given the strategy to directly request the participation of providers that had been public about their engagement on the issues – the "climate innovators" in the sample).

Second, the sample of respondents also had an overrepresentation of community health centers relative to other organization types. Such enthusiasm may signal that these provider types have disproportionately been affected by the negative consequences of climate change and have limited resources to respond, given their safety net provider status. Thus, this oversampling, combined with the oversampling of climate innovators, suggests the sample reflects experiences at the extreme – large health systems with more resources to implement high-cost interventions and small community-based providers on the frontline with limited supports.

Third, the survey administrators had no control over which individuals at the organizations responded to the survey, which may have affected the quality and reliability of the information provided to the Committee. In some cases, this may have resulted in incomplete or incorrect information being reported. Additionally, Ways and Means staff did not have the ability to verify the data provided.

Finally, given the breadth of information provided to the Committee, the analysis required individual staff members to make a series of judgement calls when summarizing materials. While staff sought to employ an objective and standardized approach to its review of all submissions, there were likely some inevitable inconsistencies in approach.

Despite these limitations, this study is the first of its kind to examine how health care organizations are affected by and can help address the climate crisis. Future work could leverage these findings as a baseline to delve deeper into the specific topics included in the surveys with a more targeted group of providers

SUPPLEMENTAL TABLES

Table 1. Descriptive characteristics of climate innovators and providers

Variables	Total (n = 63)		Climate Innovators (n = 14)		Providers (n = 49)		χ2 (df)
	Count	Percent	Count	Percent	Count	Percent	
Organization Type							
Multihospital System	18	28.6%	9	64.3%	9	18.4%	20.09 (3)***
Health System	12	19.1%	5	35.7%	7	14.3%	
Community Health Center	26	41.3%	0	0.0%	26	53.1%	
Other	7	11.1%	0	0.0%	7	14.3%	
Experienced any climate events in past five years							
Yes	54	85.7%	11	78.6%	43	87.8%	0.75 (1)
No	9	14.3%	3	21.4%	6	12.2%	
Experienced five or more climate events in past five years							
Yes	37	58.7%	11	78.6%	26	53.1%	2.92 (1)
No	26	41.3%	3	21.4%	23	46.9%	
Dedicated some resources to address climate crisis							
Yes	47	74.6%	14	100.0%	33	67.4%	6.13 (1)*
No	16	25.4%	0	0.0%	16	32.7%	
Have standing agenda items at board level							
Yes	24	38.1%	6	42.9%	18	36.7%	0.17 (1)
No	39	61.9%	8	57.1%	31	63.3%	
Have executive-level working groups							
Yes	41	65.1%	12	85.7%	29	59.2%	3.37 (1)
No	22	34.9%	2	14.3%	20	40.8%	
Have dedicated staff							
Yes	34	54.0%	13	92.9%	21	42.9%	10.96 (1)**
No	29	46.0%	1	7.1%	28	57.1%	
Have climate action or preparedness plan (CAPP)							
Yes	24	38.1%	7	50.0%	17	34.7%	1.08 (1)
No	39	61.9%	7	50.0%	32	65.3%	
Use at least one tool to track carbon emissions							
Yes	31	49.2%	13	92.9%	18	36.7%	13.72 (1)***
No	21	50.8%	1	7.1%	31	63.3%	

Have internal sustainability goals†							
Yes	**20**	**80.0%**	**10**	**100.0%**	**10**	**66.7%**	**4.17 (1)***
No	**5**	**20.0%**	**0**	**0.0%**	**5**	**33.3%**	
Have sustainability goals that are public							
Yes	**16**	**25.4%**	**8**	**57.1%**	**8**	**16.3%**	**9.57 (1)****
No	**47**	**74.6%**	**6**	**42.9%**	**41**	**83.7%**	
Use program to reduce carbon footprint of workforce							
Yes	**30**	**47.6%**	**12**	**85.7%**	**18**	**36.7%**	**10.47 (1)****
No	**33**	**52.4%**	**2**	**14.3%**	**31**	**63.3%**	
Use program to reduce organization's carbon footprint							
Yes	**34**	**54.0%**	**14**	**100.0%**	**20**	**40.82%**	**15.35 (1)*****
No	**29**	**46.0%**	**0**	**0.0%**	**29**	**59.2%**	
Have plans for new dedicated staff to address climate crisis							
Yes	**24**	**38.1%**	**9**	**64.3%**	**15**	**30.6%**	**5.24 (1)***
No	**39**	**61.9%**	**5**	**35.7%**	**34**	**69.4%**	
In position to achieve targets more quickly than federal, state, and/or local government							
Yes	**25**	**39.7%**	**10**	**71.4%**	**15**	**30.6%**	**7.57 (1)****
No	**36**	**60.3%**	**4**	**28.6%**	**34**	**69.4%**	

† Only 25 out of 63 respondents answered this question on this survey (10 Climate Innovators and 15 Providers).
*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 2. Descriptive characteristics of health care organization types

Variable	Multihospital System (n = 18)		Health System (n = 12)		Community Health Center (n = 26)		Other (n = 7)		χ2 (df)
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	
Experienced any climate events in past five years									
Yes	14	77.8%	9	75.0%	25	96.2%	6	85.7%	4.37 (3)
No	4	22.2%	3	25.0%	1	3.9%	1	14.3%	
Experienced five or more climate events in past five years									
Yes	10	55.6%	8	66.7%	14	53.9%	5	71.4%	1.11 (3)
No	8	44.4%	4	33.3%	12	46.1%	2	28.6%	
Dedicated some resources to address climate crisis									
Yes	16	88.9%	11	91.7%	16	61.5%	4	57.1%	7.25 (3)
No	2	11.1%	1	8.3%	10	38.5%	3	42.9%	
Have standing agenda items at board level									
Yes	9	50.0%	2	16.7%	9	34.6%	4	57.1%	4.63 (3)
No	9	50.0%	10	83.3%	17	65.4%	3	42.9%	
Have executive-level working groups									
Yes	16	88.9%	9	75.0%	12	46.2%	4	57.1%	9.30 (3)*
No	2	11.1%	3	25.0%	14	53.8%	3	42.9%	
Have dedicated staff									
Yes	14	77.8%	10	83.3%	7	26.9%	3	42.9%	16.28 (3)***
No	4	22.2%	2	16.7%	19	73.1%	4	57.9%	
Have climate action or preparedness plan (CAPP)									
Yes	9	50.0%	3	75.0%	9	34.6%	3	42.9%	2.16 (3)
No	9	50.0%	9	25.0%	17	65.4%	4	57.1%	
Use at least one tool to track carbon emissions									
Yes	14	77.8%	8	66.7%	7	26.9%	2	28.6%	13.70 (3)**
No	4	22.2%	4	33.3%	19	73.1%	5	71.4%	
Have internal sustainability goals†									
Yes	9	100.0%	8	100.0%	1	16.7%	2	100.0%	19.79 (3)***
No	0	0.0%	0	0.0%	5	83.3%	0	0.0%	
Have sustainability goals that are public									
Yes	6	33.3%	8	66.7%	0	0.0%	2	28.6%	20.27 (3)***
No	12	66.7%	4	33.3%	26	100.0%	5	71.4%	
Use program to reduce carbon footprint of workforce									
Yes	15	83.3%	10	83.3%	4	15.4%	1	14.3%	29.29 (3)***
No	3	16.7%	2	16.7%	22	84.6%	6	85.7%	

Use program to reduce organization's carbon footprint									
Yes	**16**	**88.9%**	**11**	**91.7%**	**5**	**19.2%**	**2**	**28.6%**	**30.15 (3)*** **
No	**2**	**11.1%**	**1**	**8.3%**	**21**	**80.8%**	**5**	**71.4%**	
Have plans for new dedicated staff to address climate crisis									
Yes	**13**	**72.2%**	**6**	**50.0%**	**3**	**11.5%**	**2**	**28.6%**	**17.66 (3)** **
No	**5**	**27.8%**	**6**	**50.0%**	**23**	**88.5%**	**5**	**71.4%**	
In position to achieve targets more quickly than federal, state, and/or local government									
Yes	**9**	**50.0%**	**8**	**66.7%**	**6**	**23.1%**	**2**	**28.6%**	**7.81 (1)**
No	**9**	**50.0%**	**4**	**33.3%**	**20**	**76.9%**	**5**	**71.4%**	

† Only 25 out of 63 respondents answered this question on this survey (9 Multihospital systems, 8 Hospital systems, 6 Community Health Centers, and 2 Other).
*p < 0.05, **p < 0.01, ***p < 0.001