

# Public Transportation and Extreme Weather Events – Results of a National Survey

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# Introduction

- Extreme weather events
  - disrupt transit operations,
  - impair service quality,
  - increase threats to public safety, and
  - damage infrastructure.
- This talk presents the findings from a recent national survey of public transit agencies in the US investigating their extreme weather experiences, perceived risks, responses, coordination efforts and preparation activities.

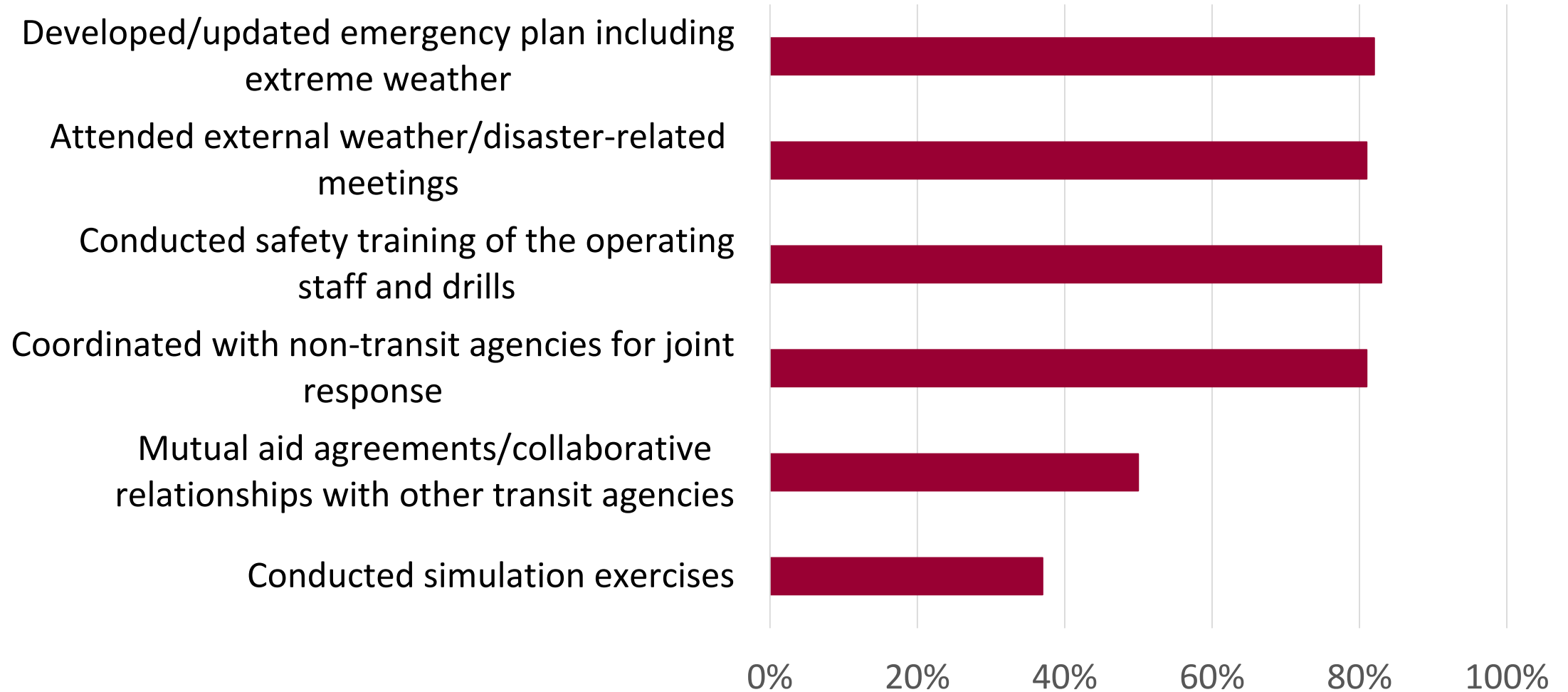
# Survey Methods

- Sample Frame: Selected all fixed-route transit agencies operating bus or/and rail transit services in US metro areas; annual fare revenue 1M\$+ in 2013 (NTD). Managers of five major departments: operations, maintenance, service planning, strategic planning, and engineering. Final sample: 892 respondents in 273 transit agencies.
- Survey Design: 1) Formal interviews from a purposive sample of managers in four transit agencies to inform survey; 2) Survey instrument design and pretest; 3) Full Survey Administration April 28 - June 11, 2016.
- Response Rate: 306 individuals completed the full survey for a 35% response rate; 199 agencies provided at least one response (73%).

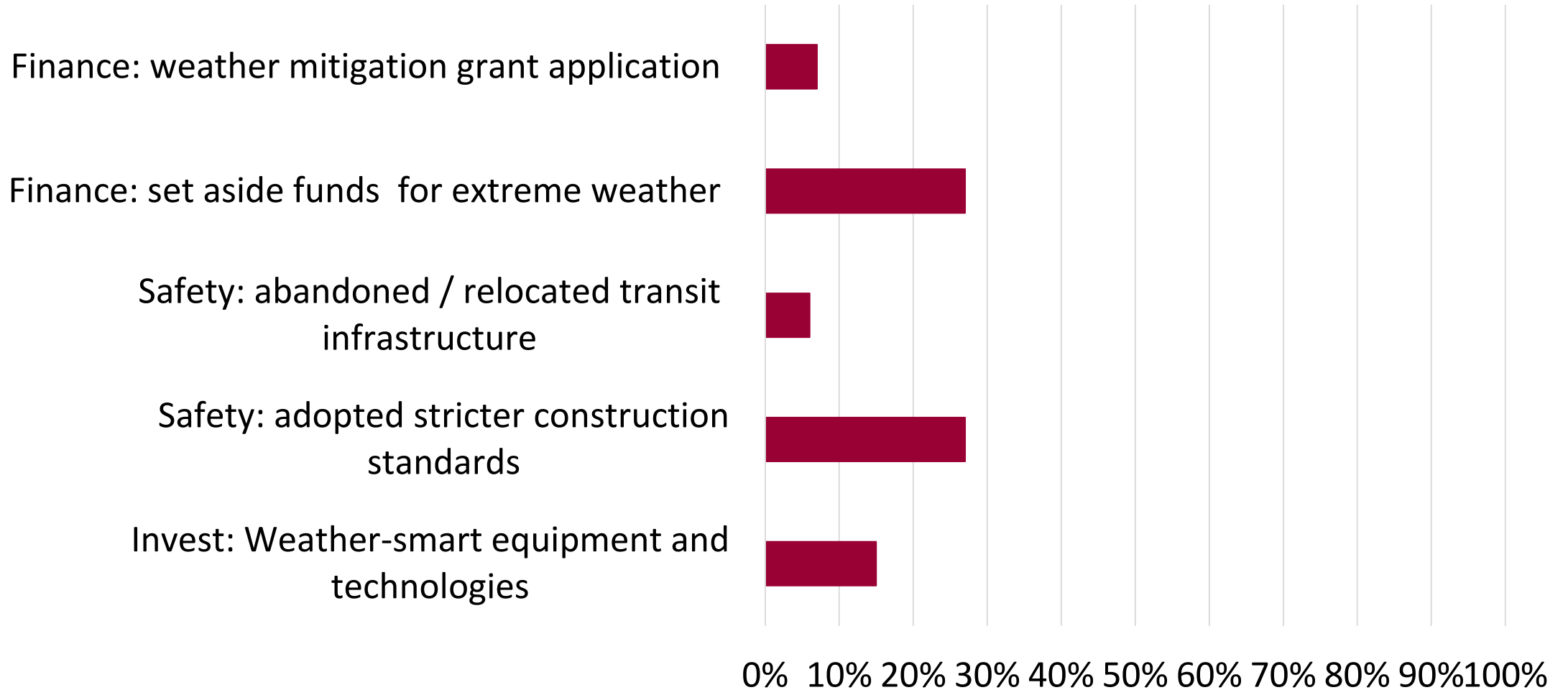
# Manager awareness / concern about extreme weather

Scale: 1=strongly disagree; 2=disagree; 3=neither disagree nor agree; 4=agree; 5=strongly agree	N	Mean (sd)	% Agree/Strongly Agree
My agency is increasingly concerned about the impact of extreme weather events on our transit infrastructure.	294	3.27 (1.10)	48.15%
Most people in my agency recognize that extreme weather events are becoming more frequent.	290	3.24 (0.88)	41.41%
My agency is increasingly concerned about the impact of extreme weather events on our transit operations.	292	3.30 (1.02)	49.83%
Most people in my agency recognize that extreme weather events are becoming less severe.	294	2.38 (0.71)	4.38%

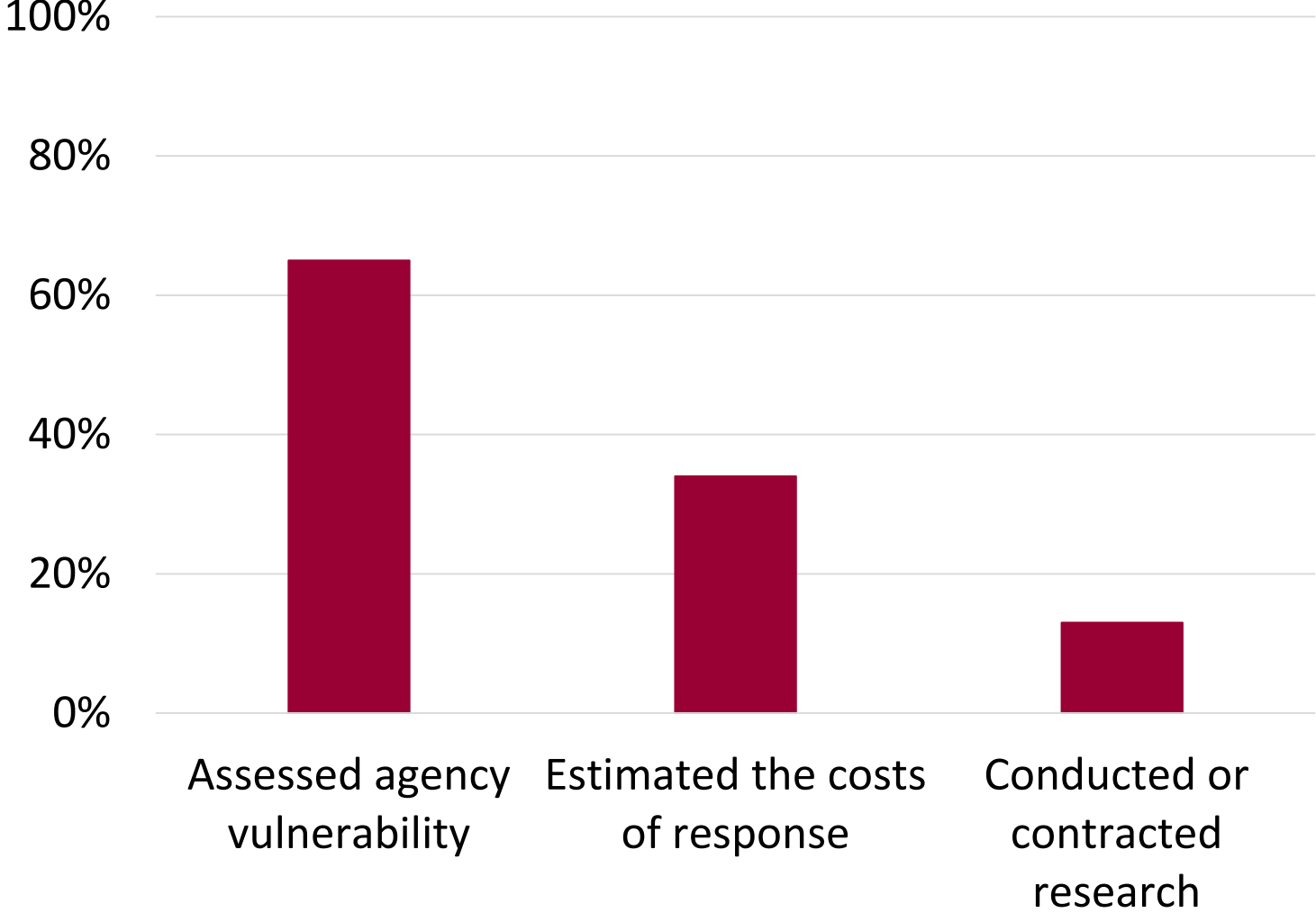
# Agency emergency response: percent 'yes'



# Adaptation strategies: investment, safety and finance



# Risk assessment strategies



# Limiting factors

Scale: 1=not significant at all; 2=slightly significant; 3=moderately significant; 4=very significant; 5=extremely significant	<b>N</b>	<b>Mean (sd)</b>
Financial resources	288	2.62 (1.14)
Internal coordination	288	2.07 (1.09)
Awareness of risks	285	2.02 (1.04)
Public concern	281	2.01 (1.06)
Uncertainty about options	283	1.97 (0.97)
External political support	287	1.93 (1.08)
Agency leadership	290	1.82 (1.19)



## ■ **Agency responses**

- Many transit agencies report high awareness and concern about extreme weather.
- Most agencies address extreme weather using emergency response, rather than longer-term adaptation strategies.
- Many agencies have undertaken vulnerability assessments, few have estimated costs or conducted research on weather risks.
- Over half of all agencies have specific protocols to coordinate extreme weather response with local government emergency and non-emergency departments, utilities and state DOTs.

## ■ **Constraints to action**

- Financial resources followed by internal coordination challenges are the most significant constraints on agency ability to prepare for extreme events.

# Conclusions

- Extreme weather negatively affects transit agencies in the US.
- As events become more frequent and more severe, costs and consequences will rise.
- Agencies are undertaking mitigation efforts, but these are mainly *ex post* emergency response driven, rather than *ex ante* preparation and investment oriented.
- Future research should investigate why some agencies are more likely to undertake *ex ante* adaptation efforts than others.

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## Framework for Assessing the ROI for High-Speed and Intercity Rail Projects

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## Other projects

- Transit Resiliency in Chicago area
- Last mile study for public transportation
- Transit Access to Health
- Database of transportation providers (Human Service Transportation and downstate transit)
- Development of transit availability and transit accessibility index

# Thank You!

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