

Maricopa County Household Water Use in a Heat Wave-Power Failure Emergency



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Introduction

Heat exhaustion, heat stroke, and heat death are health concerns often overlooked or underestimated, leading to many preventable deaths. These heat-related health concerns are often prevented through cooling strategies, one of the most common being air conditioning. However, in events such as power outages, electric cooling devices are not available. A concurrent heat wave-power failure event requires alternative cooling strategies, such as water cooling strategies.

Questions:

- What ways would Maricopa County households use water during a concurrent heat wave-power failure?
- How do those uses rely on the assumption or knowledge of available and reliable water?

The feasibility and safety of household coping strategies and assumptions were asked to water managers. It is important to understand how these assumptions affect the different uses of water, as a high reliance on cooling strategies that involve water may leave people ill-prepared for situations in which they would not have water.

Methods

40 households in the Phoenix Metropolitan Area were interviewed summer 2016 by ASU researchers as part of a larger study. This research uses a subset of the data collected.

The interview format:

- Risk perception
- Making and sorting cards
- A vignette scenario

Household interview transcripts were coded to identify themes and determine non-water use and water use frequency counts.

A codebook was developed to gather frequency counts on mentioned themes and to collect data on non-water use and water use types. This codebook grew over time as themes in responses were identified by the coder.

Notable coping strategies from the household interviews were the basis for water manager interview questions. A protocol was developed for said interviews and data collection is still in the early stages.

Government
Gov_Bef
Gov_Dur
Gov_Aft
Water Use
WUL_Drink
WUL_Non_Drink
WUU
Buy_Water
Water_Store
Communication
Communication
Water Access
No_Acc_Bef
No_Acc_D2
Non-Gov Agencies
Utility_Think
Utility_Do
Alt_Org
Non-Water Use
NWU
Leave
Car
Not_Do
Changes
Want_Water
Want_No_Water
Change_Water
Change_No_Water

Figure (1): Codebook Themes

Water Use Types	Non-Water Use Types
Drink	Leave (metro area)
Evaporative cooling on body	Go elsewhere
Pool	Less exertion
Shower/bath	Close windows/doors
Ice	Wear less clothes
Body of water	Shade
Mister	Open windows/doors
Evaporative cooling in enviro	Hand fan
Hose/sprinkler	Outside
Other	Other

Figure (2): Types of Coping Strategies

Results

Coping Strategies

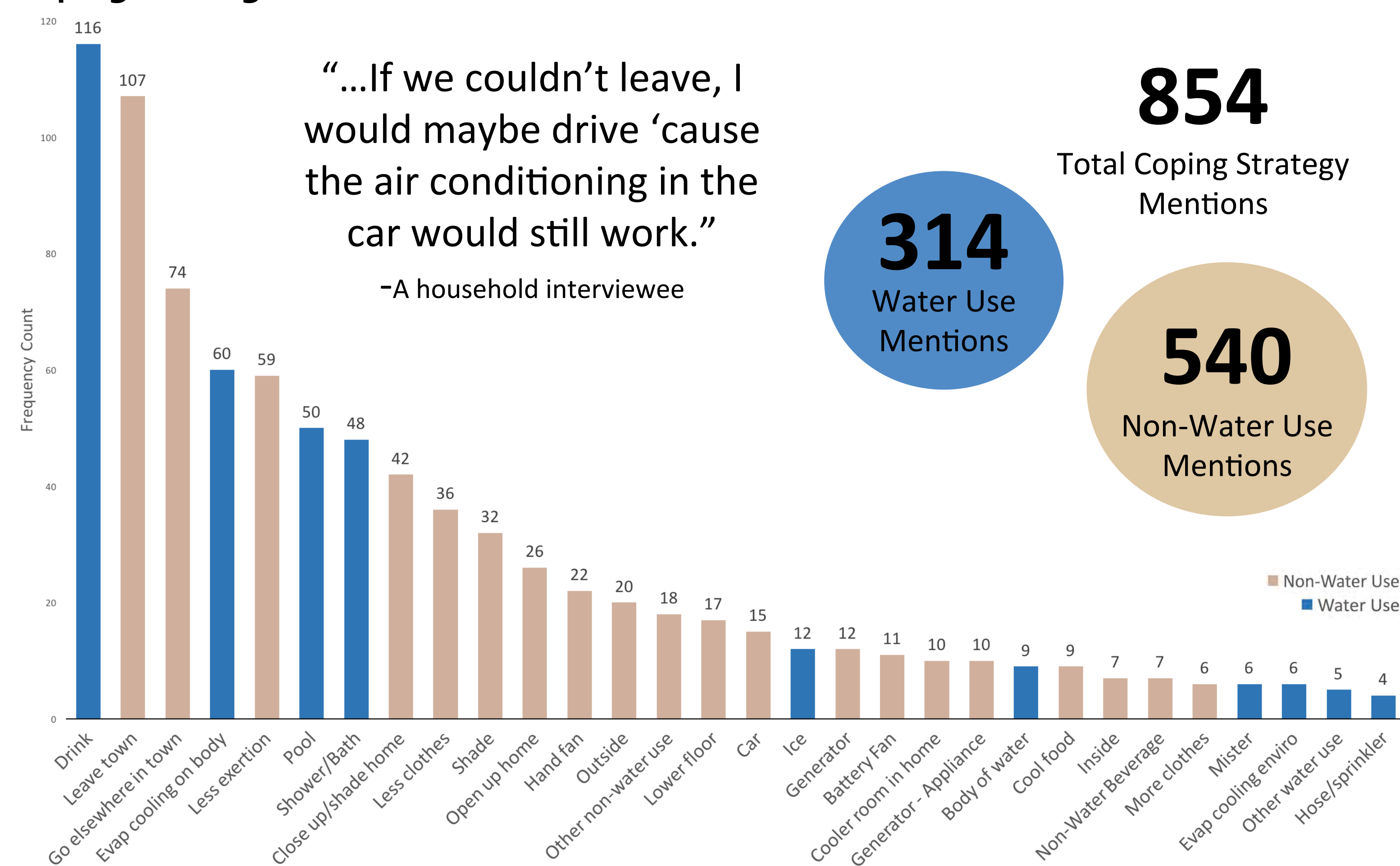


Figure (3): Household Coping Strategies

- Both non-water and water coping strategies would be used, though non-water strategies are more likely to be used due to the variety of uses available.

Household Water Use

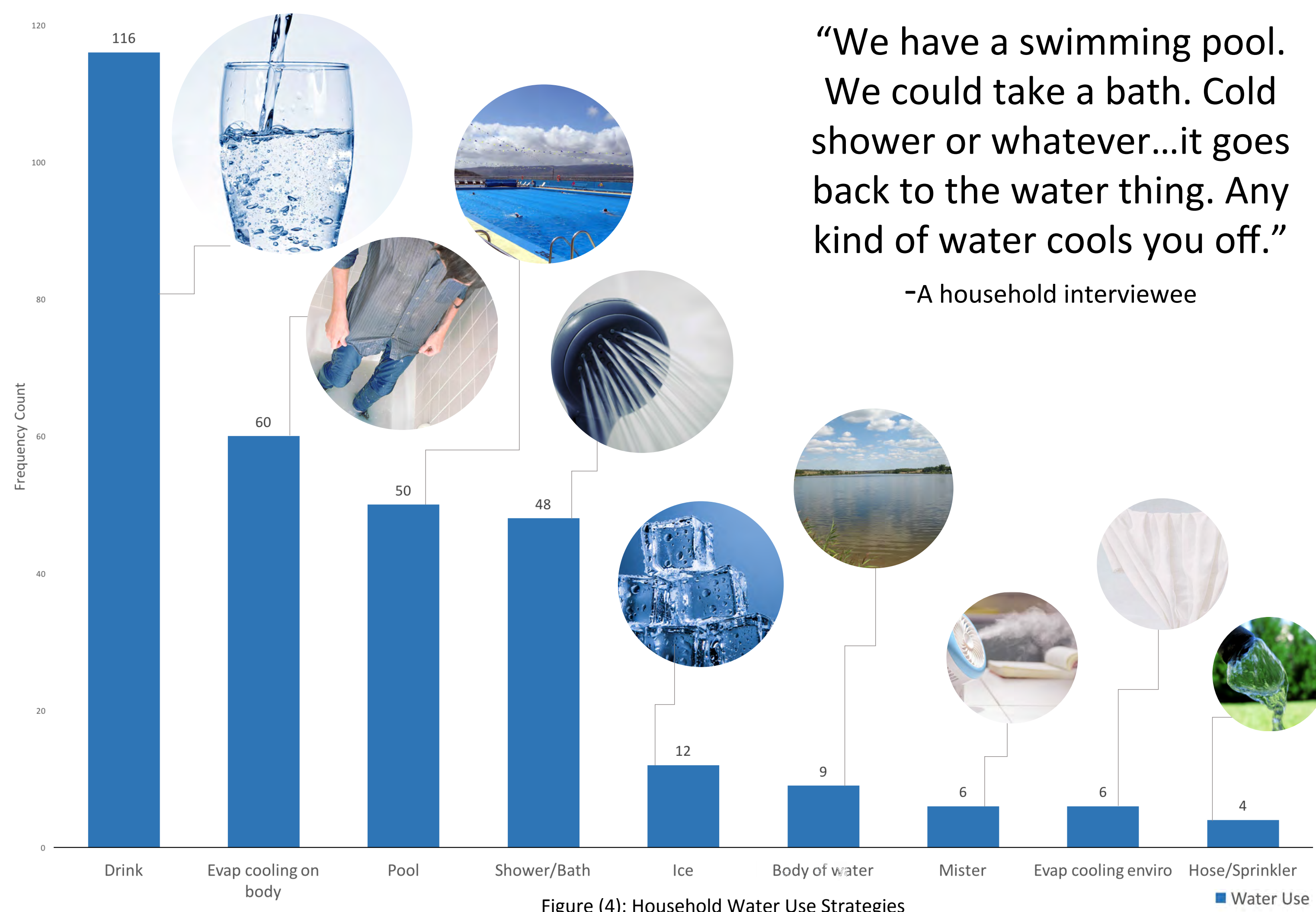


Figure (4): Household Water Use Strategies

- Water is used mainly in a consumptive way; potable water must be accessible for most of the ways interviewees would cope using water in a concurrent heat wave-power outage.

Discussion

Both non-water and water coping strategies would be used by Maricopa County household participants during a concurrent heat wave-power failure. As drinking water is the most frequently mentioned strategy, potable water is a necessity. Water availability does not appear to greatly affect total mentioned coping strategies, though further research can be done on changing coping strategies over time in the scenario. Since evacuation is a frequently mentioned coping strategy for household participants, further research is suggested on the feasibility and safety of mass evacuation.

Coping Strategies based on Water Availability

NAB	NAD2	Water Store	Nothing	Fine
1 Drink	Leave town	Drink	Go elsewhere in town	Less exertion
2 Evap cooling on body	Drink	Leave town	Drink	Evap cooling on body
3 Less exertion/Leave town	Pool	Go elsewhere in town	Leave town	Leave town/Lower floor

Figure (5): Top Three Coping Strategies

- Leaving town is a common coping strategy for all groups, regardless of water availability.
- NAD2 mention storing water much more than the other groups. This may be due to the time in the interview water unavailability is considered; by Day 2, participants may have felt that there would not be water left to buy.
- There do not appear to be many differences between those who considered water unavailability before told by the interviewer and those who did not. The main difference is in mentions of buying water, as NAB mention buying water much more than the other groups.

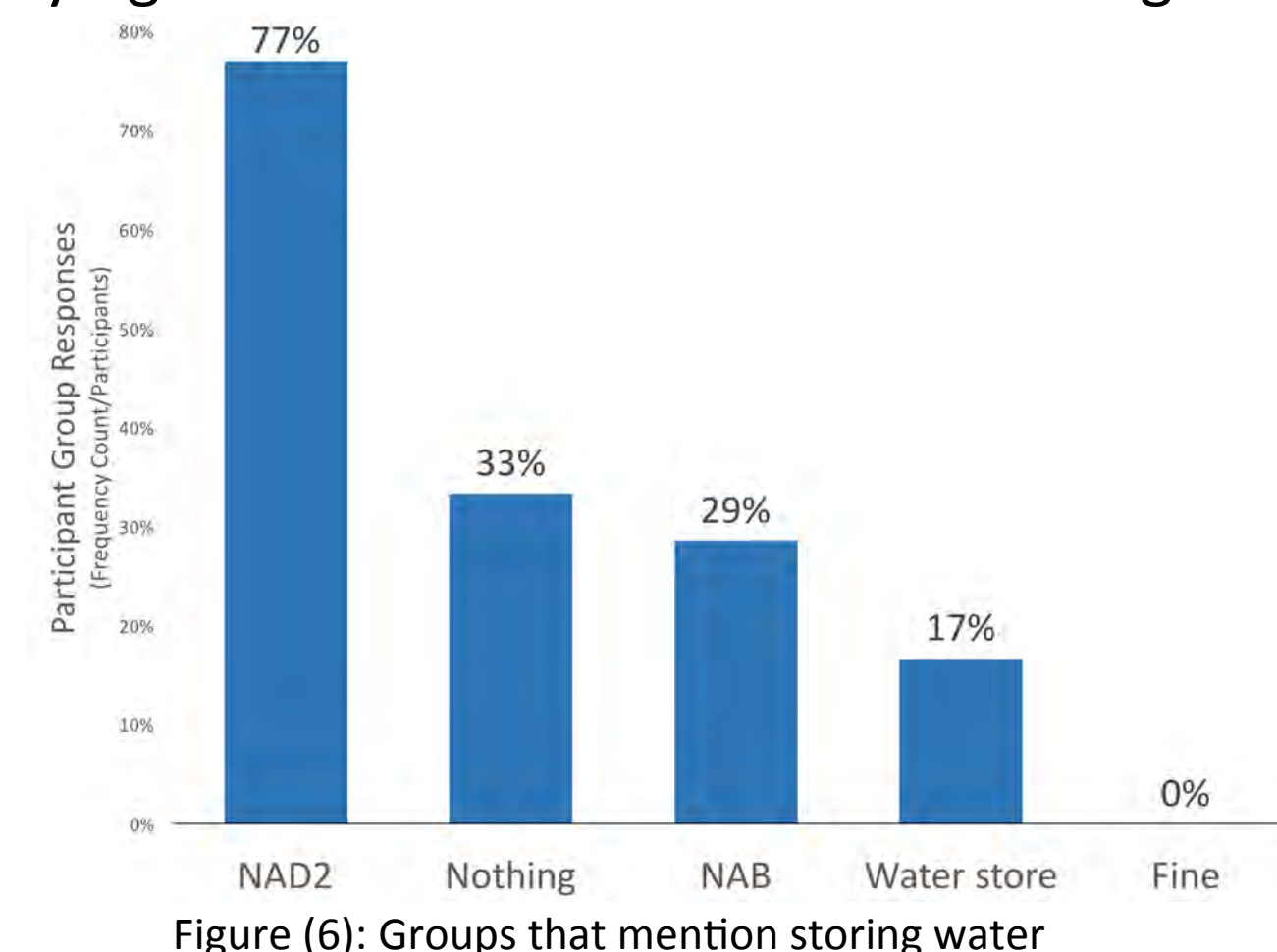


Figure (6): Groups that mention storing water

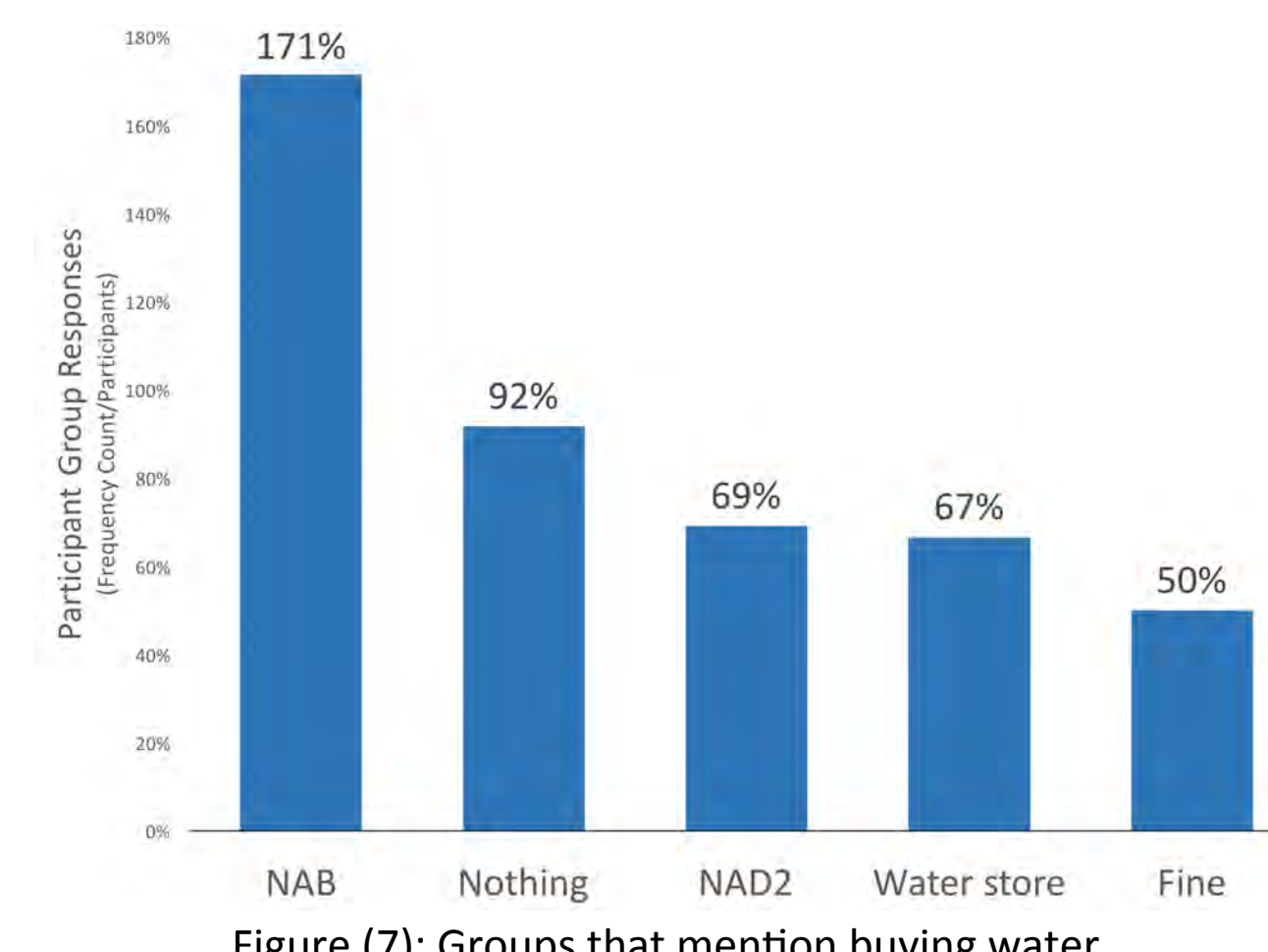


Figure (7): Groups that mention buying water

Tap Water Availability

- 13 out of 40** participants mentioned altering coping strategies involving water after told about water pressure on Day 2. (NAD2)
- 12 out of 40** participants did not mention changing strategies or having concern about water availability during the vignette. (Nothing)
- 7 out of 40** participants mentioned water unavailability during the vignette before it was mentioned by the interviewer on Day 2. (NAB)
- 6 out of 40** participants mentioned previously stored water available to them after told about water pressure on Day 2. (Water Store)
- 2 out of 40** participants mentioned assured water availability throughout the vignette. (Fine)

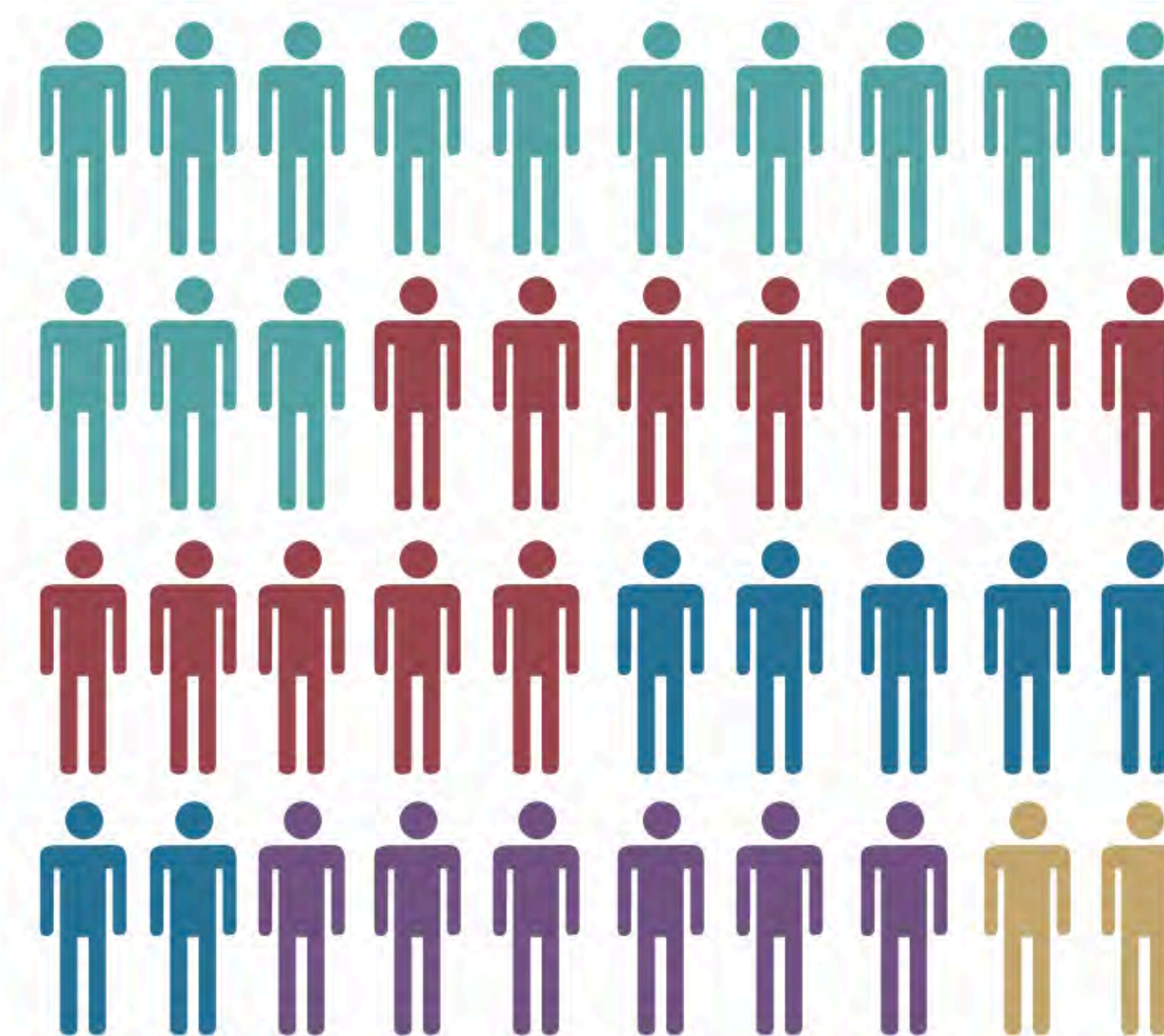


Figure (8): Household Participant Groups

Water Manager Interview

- A concurrent heat wave-power outage is highly unlikely.
- Water pressure during the scenario would be affected depending on the location of the individual.
- It is not advised to go into the canals as a cooling strategy, though recreational bodies of water are available.
- Utility companies have Ice Plans for ice distribution during extended outages.

“...we work with the media to let people know where they'll have refrigerated trucks where they can go and get ice... nowadays with people having their smart phones...we can also communicate...”
-A water manager

Acknowledgements

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