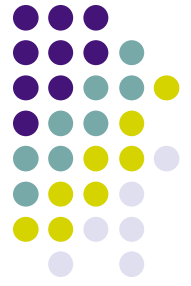


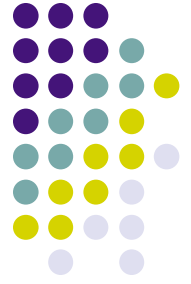
A Comparison of the Experiences of Harris County Residents during Hurricanes Rita and Ike



Robert M. Stein
Leonardo Dueñas-Osorio
Devika Subramanian
Stephanie Post
Lindsay Zwiener
Dana Hoffman
Ian Feldman

March 12, 2009
Rice University

Surveys



Hurricane Rita 2005

September 29 – October 3, 2005

Random digit dial sample of 405 Harris County adults

Error rate: +/- 4.8%

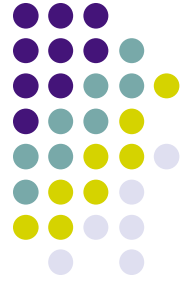
Hurricane Ike 2008

September 23 – October 24, 2008

Random digit dial sample of 1,503 Harris County adults

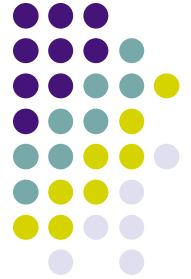
Error rate: +/- 2.5%

Research Questions



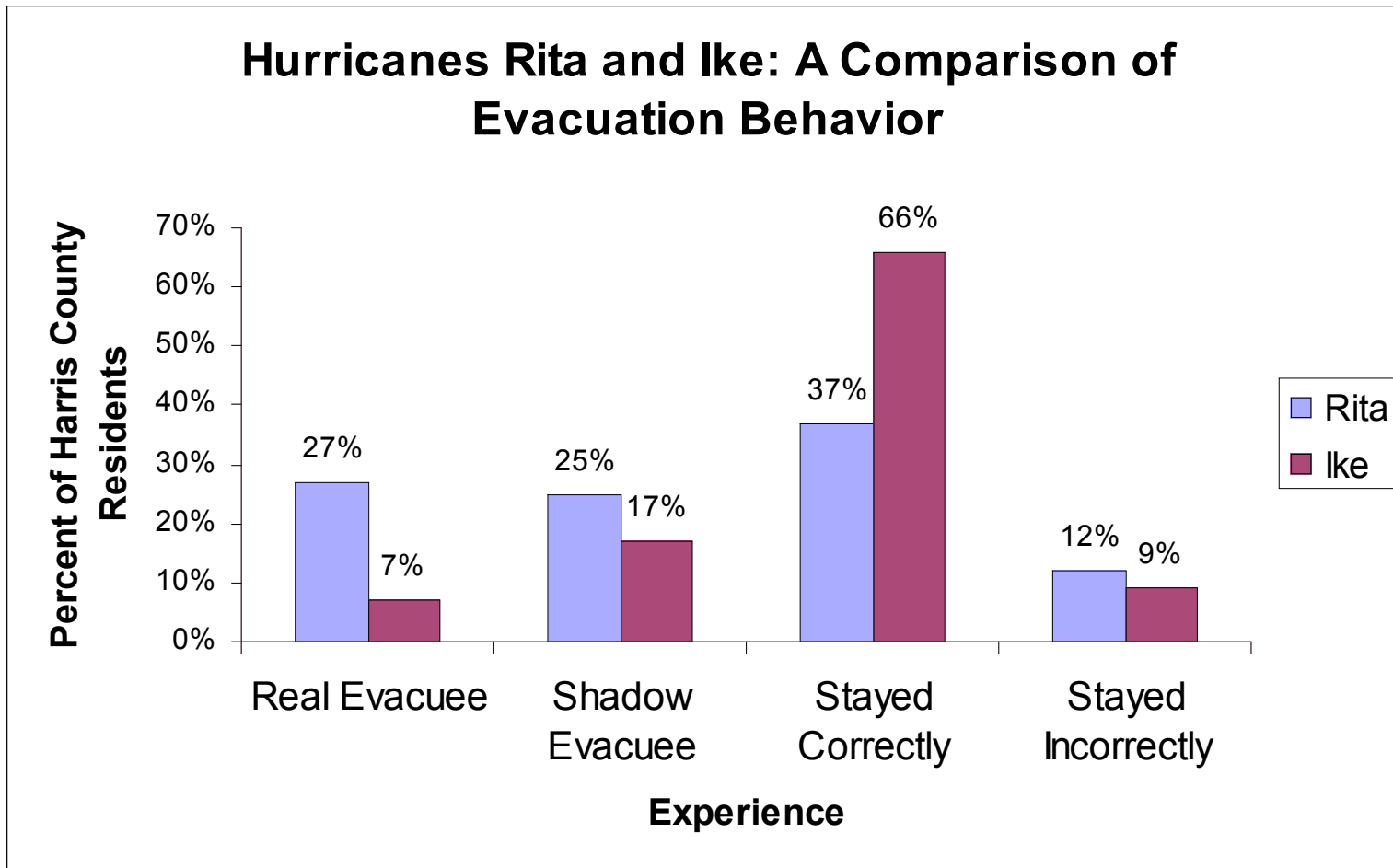
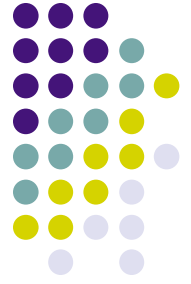
- What was the response of Harris county residents to Hurricanes Rita and Ike? Who evacuated, when did they evacuate and who stayed?
- What factors shaped, influenced and determined Harris county residents' response to Hurricanes Rita and Ike?
- What actions did Harris County residents take in preparation for Hurricane Ike?
- What will Harris County residents do in the future when faced with a Category 4 hurricane?

Categorizing Residents

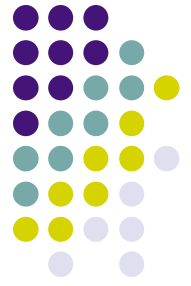


	Resident Lives in Evacuation Zone		
		Yes	No
Resident Evacuated	Yes	“Real Evacuee”	“Shadow Evacuee”
	No	“Stayed Incorrectly”	“Stayed Correctly”

Who Evacuated and Who Stayed?

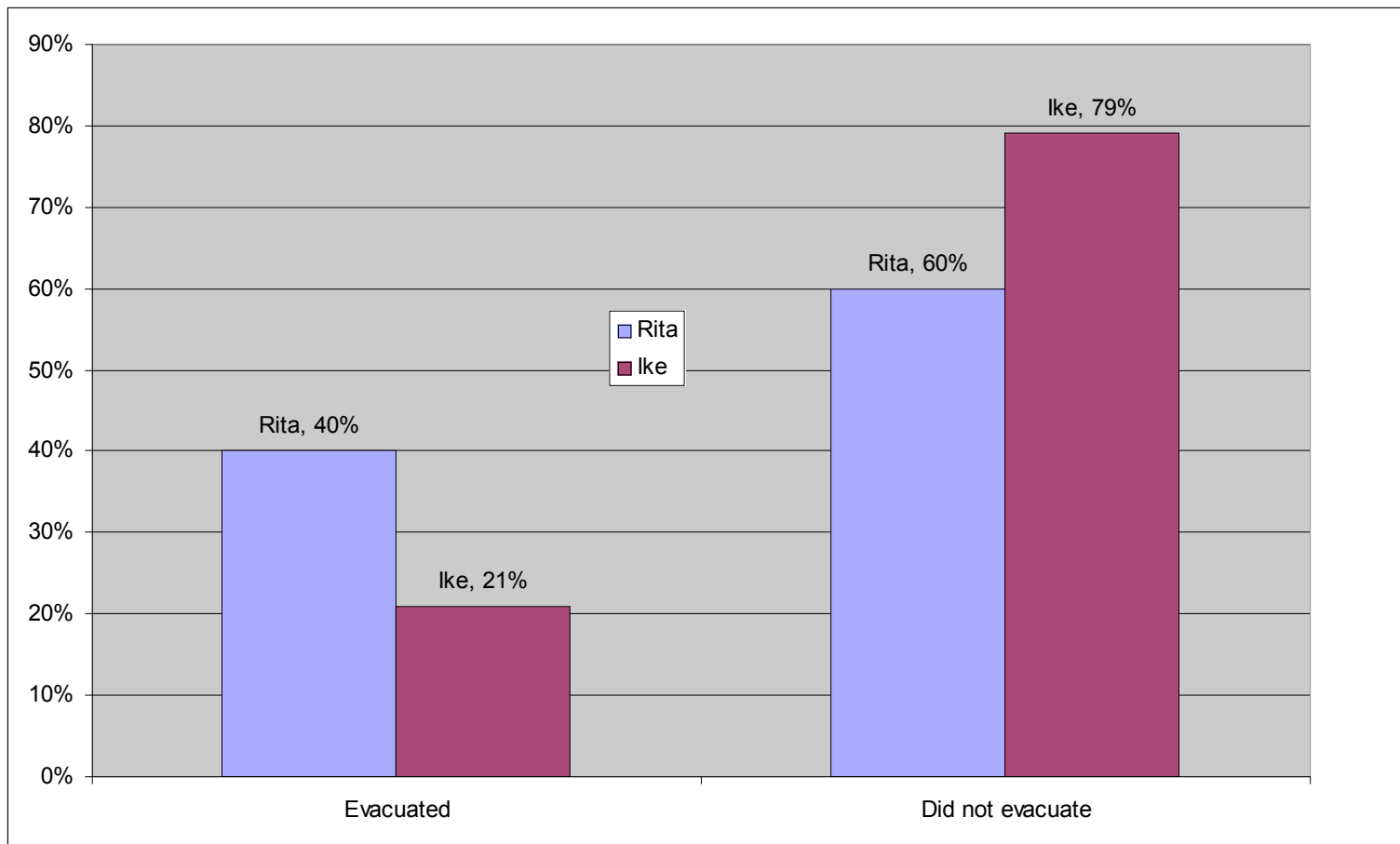


How Many Residents Evacuated?

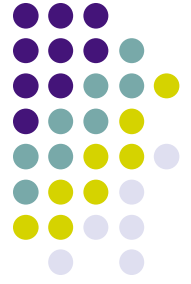


- In 2005, 52% of Harris County residents evacuated: approximately 1,920,000 residents.
- In 2008, only 24% of Harris County residents evacuated: approximately 945,000 residents.
- Approximately 975,000 fewer residents evacuated during Hurricane Ike than during Hurricane Rita.
- This is likely due to the lower predicted severity of Hurricane Ike, as Hurricane Rita was projected to be a Category 5.

Evacuation Behavior in Non-Evacuation Zones

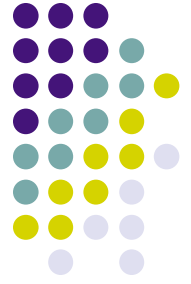


Who Evacuated?

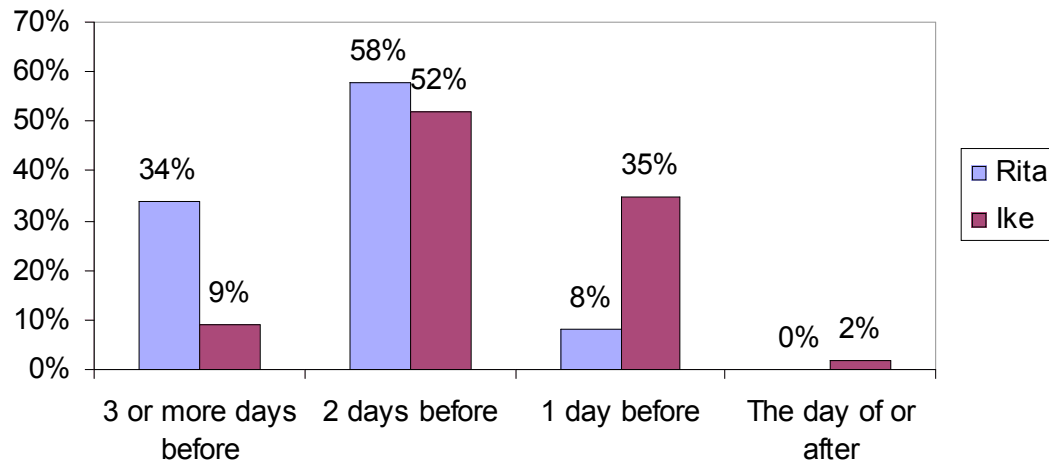


- The proportion of residents in non-evacuation zones who evacuated decreased from 40% during Hurricane Rita to 21% during Hurricane Ike.
- These “shadow evacuees” during the Hurricane Rita evacuation were largely responsible for the road congestion, which hindered the evacuation of the “real evacuees.”

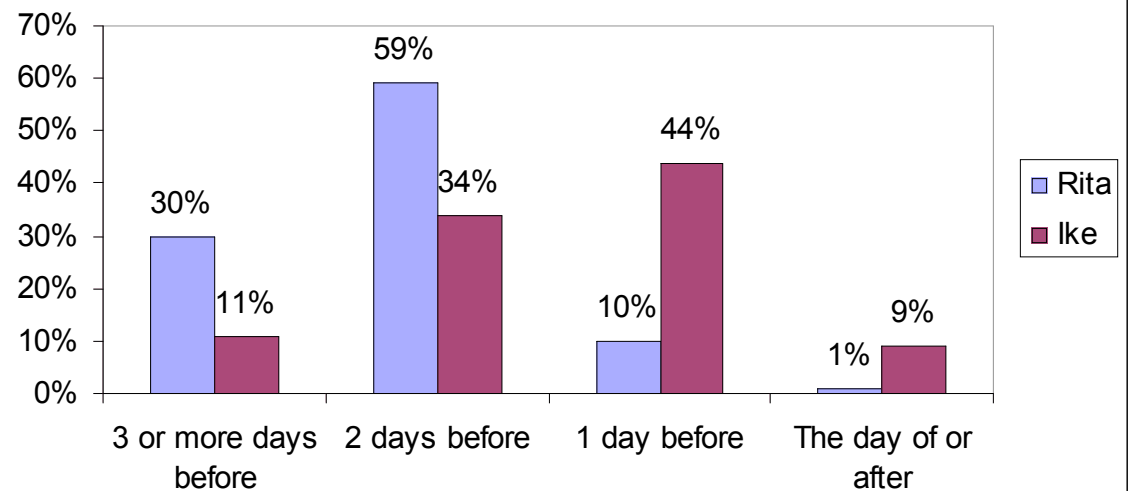
When Did They Leave?



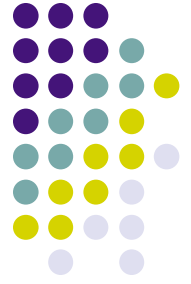
Evacuation Timing: Real Evacuees



Evacuation Timing: Shadow Evacuees



Timing of Evacuations



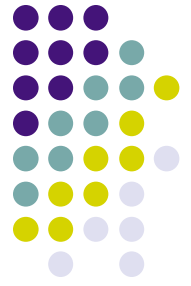
- During Hurricane Rita the timing of shadow and real evacuations significantly overlapped, which contributed significantly to roadway congestion.
- During Hurricane Ike, shadow evacuees correctly left later than did real evacuees.
- Real evacuees during Hurricane Ike left later than did real evacuees during Hurricane Rita; in fact, 35% did not evacuate until the day before Ike struck.
- Roadway congestion was not observed during Hurricane Ike because fewer residents evacuated and because shadow evacuees left later than did real evacuees.

How Did They Leave?



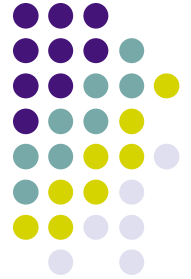
	Real Evacuees		Shadow Evacuees	
	Rita	Ike	Rita	Ike
Number of vehicles				
same vehicle	46%	65%	62%	79%
several vehicles	53%	33%	32%	18%
With how many persons did you evacuate?				
1	12%	25%	24%	29%
2	11%	20%	15%	22%
3	20%	22%	18%	13%
4	15%	6%	15%	11%
5	13%	14%	6%	6%
6	10%	5%	5%	2%
7-9	8%	1%	13%	6%
10 or more	10%	2%	5%	5%

How Did They Leave?



- Evacuees during Hurricane Rita were much more likely to take several vehicles and to evacuate with a larger group
- Shadow evacuees were more likely to travel in one vehicle than were real evacuees during both Hurricanes Rita and Ike

How Much Did They Spend?



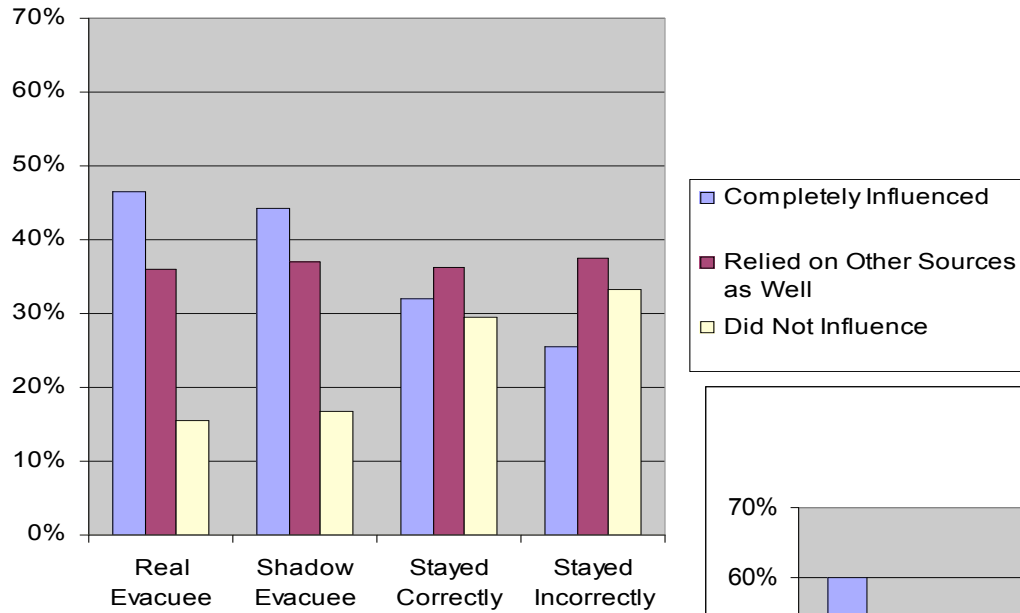
	Real Evacuees		Shadow Evacuees	
	Rita	Ike	Rita	Ike
How much money did you spend on evacuation and provisions?				
0-\$50	12%	13%	20%	14%
\$51 - \$100	13%	10%	17%	12%
\$101 - \$200	15%	17%	15%	18%
More than \$200	58%	54%	47%	50%

- Levels of spending are similar between Hurricanes Rita and Ike. Consistently, over 50% of evacuees spent more than \$200 on their evacuation and provisions.

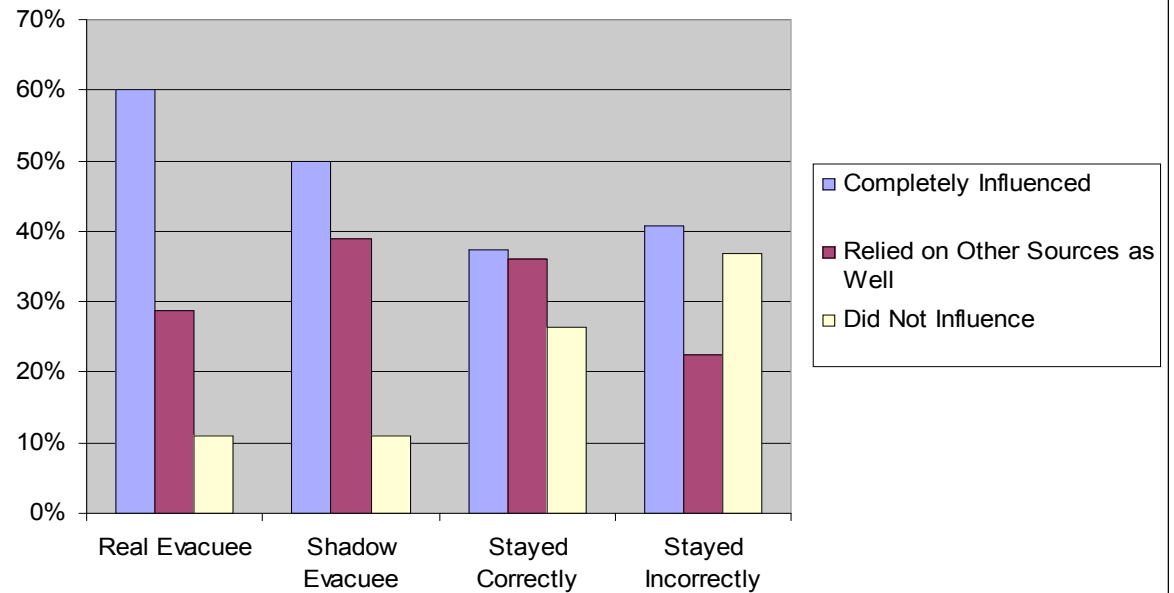
Influence of the Media



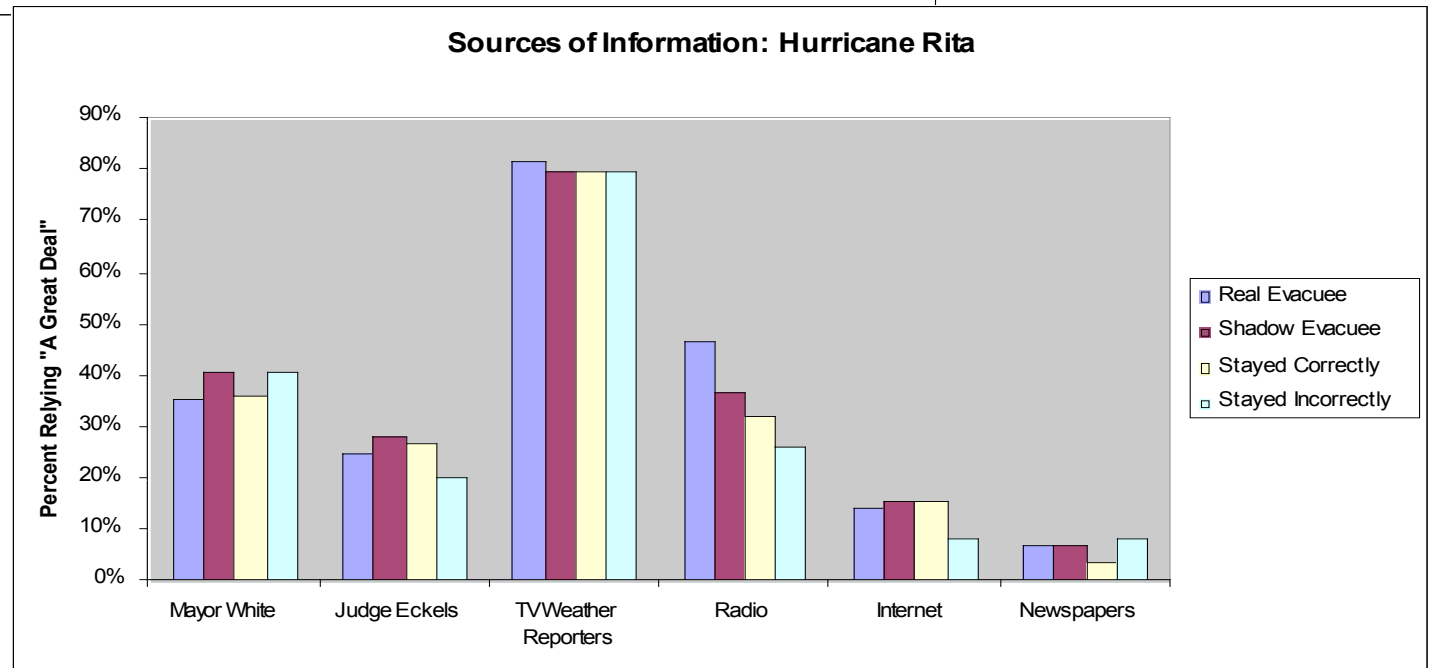
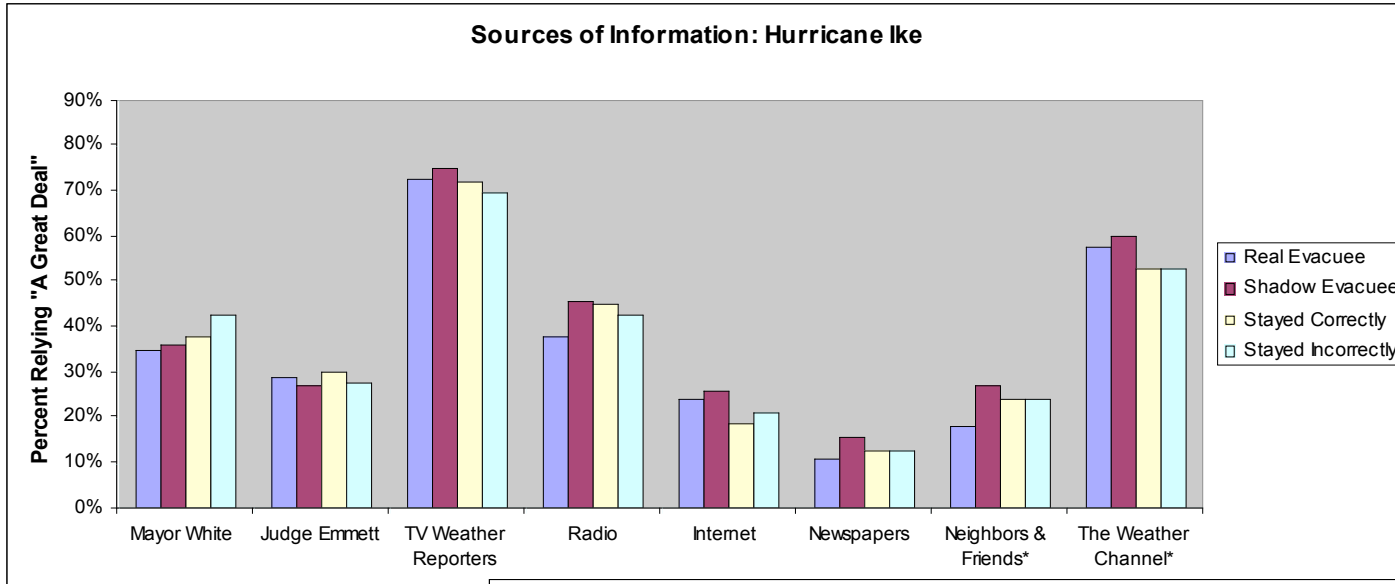
Influence of Media: Hurricane Ike



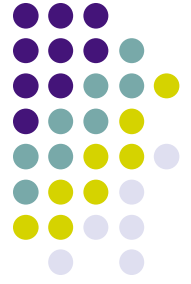
Influence of Media: Hurricane Rita



Sources of Information

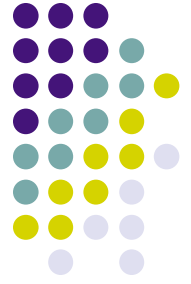


Sources of Information



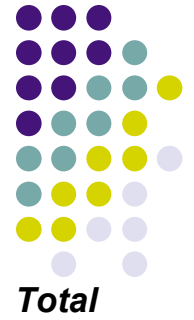
- TV Weather Reporters were the most relied upon source of information for both hurricanes, followed closely by the Weather Channel (during Hurricane Ike).
- Especially during Hurricane Ike, shadow evacuees consistently had the highest proportions relying “a great deal” across the different sources of information.

Influence of Friends and Neighbors



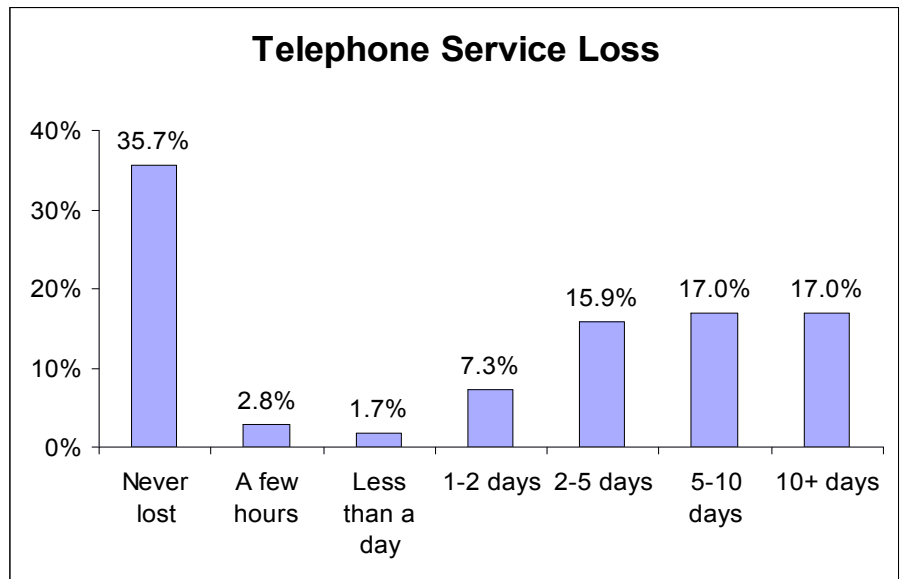
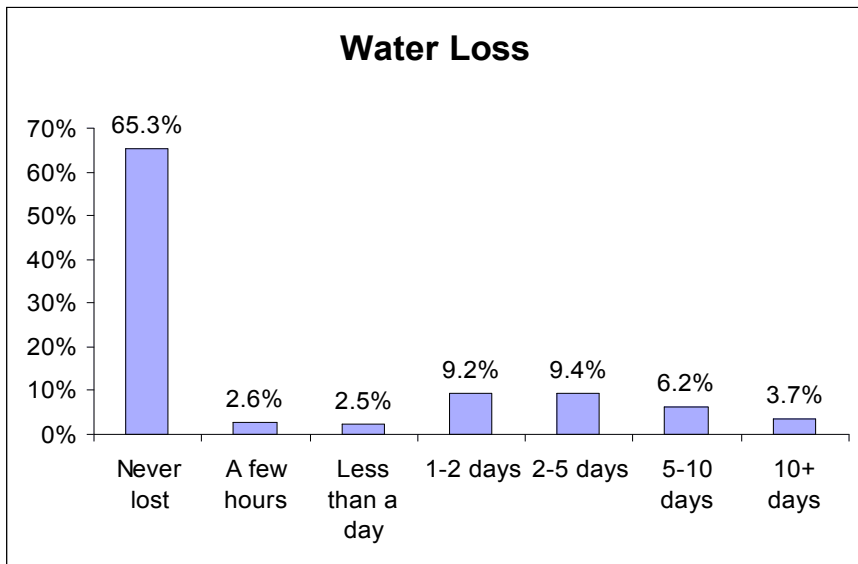
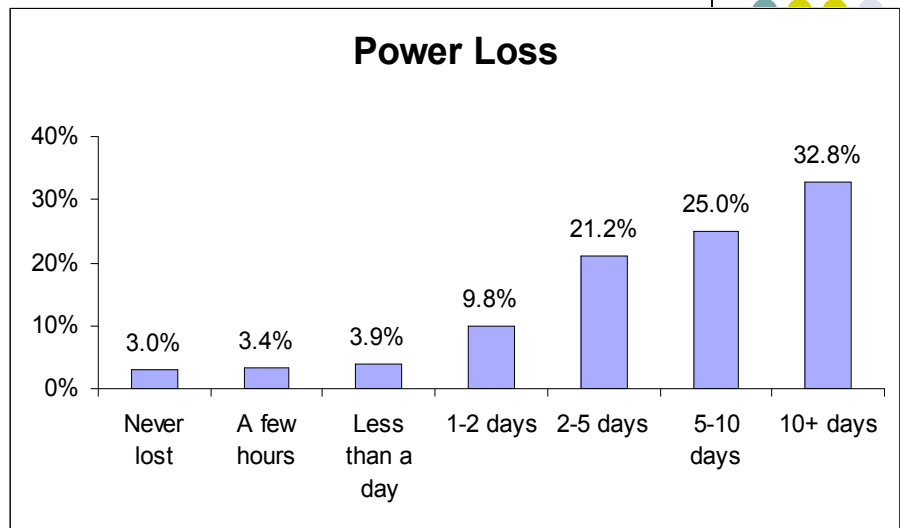
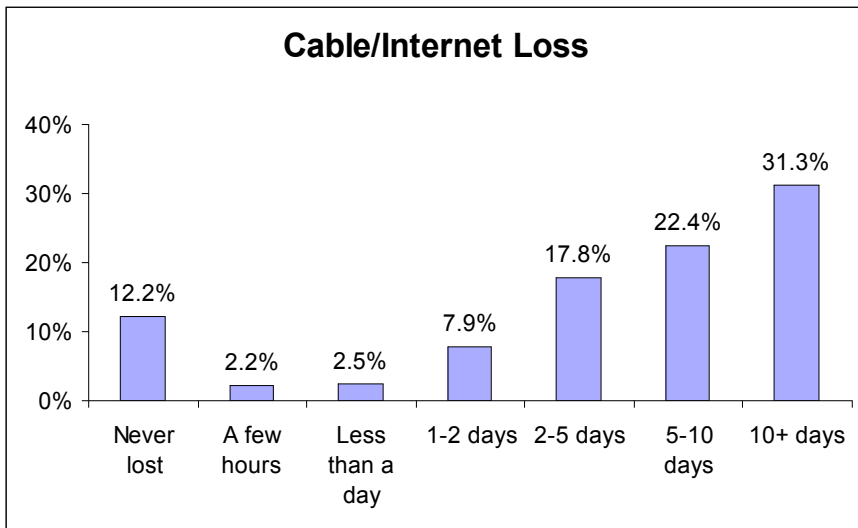
	Real		Shadow		Stayed Correctly		Stayed Incorrectly		Total	
	Rita	Ike	Rita	Ike	Rita	Ike	Rita	Ike	Rita	Ike
Information sources										
friends/neighbors										
A great deal	23%	18%	8%	27%	4%	24%	1%	24%	4%	23%
Somewhat	50%	38%	38%	29%	27%	31%	10%	31%	27%	31%
A little	25%	11%	49%	15%	52%	16%	56%	16%	52%	16%
Not at all	3%	32%	5%	28%	17%	28%	32%	28%	17%	38%

Preparing for Hurricane Ike

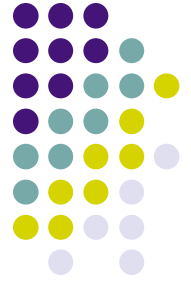


	Real Evacuees	Shadow Evacuees	Stayed Correctly	Stayed Incorrectly	Total
What percentage of residents...					
Filled vehicle with gas?	97%	88%	87%	86%	88%
Got batteries?	78%	73%	76%	78%	76%
Bought additional food?	81%	75%	84%	85%	82%
Bought bottled water?	84%	84%	87%	89%	87%
Bought a generator?	16%	13%	12%	14%	12%
Secured the outside of home?	89%	71%	79%	87%	79%
Trimmed trees?	12%	20%	22%	24%	21%
Coordinated with others?	88%	76%	62%	72%	67%

Effects of Hurricane Ike: Utilities



Effects of Hurricane Ike: Utilities



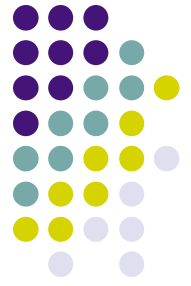
- 33% of Harris County residents were without power for 10 days or more.
- 31.3% of Harris County residents were without cable/internet for 10 days or more.
- 65% of Harris County residents never lost water service.

If a Category 4 Hurricane threatened Houston...



	Real		Shadow		Stayed Correctly		Stayed Incorrectly		Total	
	Rita	Ike	Rita	Ike	Rita	Ike	Rita	Ike	Rita	Ike
Evacuate										
Houston	69%	97%	76%	91%	48%	69%	39%	76%	59%	75%
Find someplace safe in Houston	10%	1%	6%	3%	7%	2%	4%	4%	7%	3%
Stay in my home	13%	1%	14%	3%	34%	21%	43%	14%	25%	16%
Don't Know/ Refused	8%	1%	4%	2%	11%	8%	14%	7%	9%	6%

If a Category 4 Hurricane threatened Houston...



- After Hurricane Ike, 75% of Harris County residents reported that they would evacuate if a Category 4 hurricane threatened Houston, which equates to approximately 2.9 million evacuees.
- Almost 70% of those who stayed correctly during Hurricane Ike reported that they would evacuate for a Category 4 hurricane, which would significantly add to the number of shadow evacuees.