Online Appendix for "Learning from the Storm: the Impact of Hurricane Experience on Future Disaster Preparedness"

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Table A.1: Hurricanes in the Sample

Hurricane	ID	Dates	Hit as HU	States Affected
Hurricane Dolly	AL042008	07/21-07/26/2008	✓	Texas
Hurricane Gustav	AL072008	08/29-09/05/2008	✓	Louisiana, Mississippi, Texas
Hurricane Ike	AL092008	09/07-09/15/2008	✓	Arkansas, Illinois, Indiana Louisiana, Missouri, New York Oklahoma, Texas
Hurricane Kyle*	AL112008	09/27-09/29/2008	✓	Maine
Hurricane Ida	AL112009	11/08-11/10/2009	✓	Alabama, Louisiana, Mississippi
Hurricane Earl*	AL072010	08/31-09/04/2010	✓	Massachusetts, North Carolina
Hurricane Irene	AL092011	08/23-08/29/2011	✓	Connecticut, Delaware, Maine Maryland, Massachusetts, New Hampshire New Jersey, New York, North Carolina Pennsylvania, Rhode Island, Vermont Virginia
Hurricane Isaac	AL092012	08/25-09/01/2012	✓	Arkansas, Louisiana, Mississippi Texas
Hurricane Sandy	AL182012	10/23-10/31/2012	✓	Delaware, District of Columbia, Maryland New Jersey, New York, Ohio Pennsylvania, Virginia, West Virginia
Hurricane Arthur	AL012014	06/28-07/05/2014	✓	Florida, Maine, Maryland Massachusetts, North Carolina, South Carolina Virginia
Hurricane Hermine	AL092016	08/28-09/08/2016	✓	Alabama, Florida, Georgia New Jersey, New York, North Carolina South Carolina, Virginia
Hurricane Matthew	AL142016	10/04-10/09/2016	✓	Florida, Georgia, North Carolina South Carolina
Hurricane Harvey	AL092017	08/23-09/02/2017	✓	Louisiana, Mississippi, Texas
Hurricane Irma	AL112017	09/07-09/13/2017	✓	Alabama, Florida, Georgia
Hurricane Nate	AL162017	10/06-10/10/2017	✓	Alabama, Florida, Louisiana Mississippi
Hurricane Florence	AL062018	09/11-09/18/2018	✓	Georgia, North Carolina, South Carolina
Hurricane Michael	AL142018	10/08-10/12/2018	✓	Alabama, Delaware, Florida Georgia, Maryland, North Carolina South Carolina, Virginia

*: Made landfall near Nova Scotia, Canada.

Notes: Column 1 includes each hurricane's name as named by the World Meteorological Organization. Column 2 includes the dates for each hurricane from their formation as a tropical system until their dissipation. Column 3 indicates if the listed hurricane was at least category 1 strength at the time of landfall. Column 4 includes a list of states that were impacted by the hurricane either through a warning and/or hit.

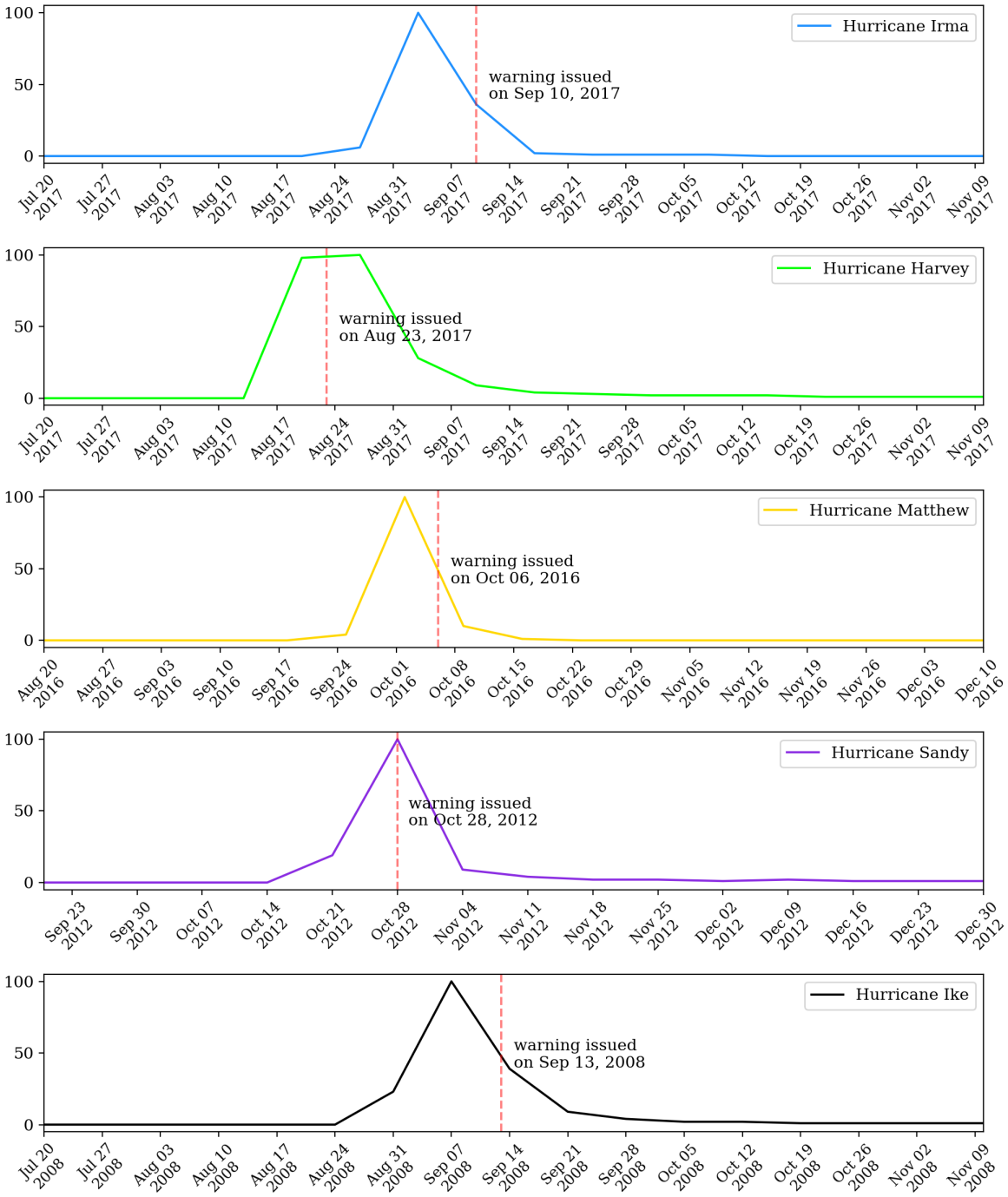


Figure A.1: Google Search Trends and the timings of the warnings issued by the National Hurricane Center for a sample of five hurricanes: Hurricane Irma, Hurricane Harvey, Hurricane Matthew, Hurricane Sandy, and Hurricane Ike.

Table A.2: Emergency Grocery-store Items Included in the Analyses

Product name
Baby Food
Baking Mixes
Baking Supplies
Batteries And Flashlights
Bottled Water
Bread And Baked Goods
Breakfast Food
Candy
Carbonated Beverages
Cereal
Coffee
Condiments, Gravies, And Sauces
Cookies
Crackers
Desserts, Gelatins, Syrup
First Aid
Flour
Fruit - Canned
Fruit - Dried
Gum
Hardware, Tools
Jams, Jellies, Spreads
Juice, Drinks - Canned, Bottled
Nuts
Packaged Milk And Modifiers
Pasta
Pet Food
Pickles, Olives, And Relish
Prepared Food: Dry Mixes
Prepared Food: Ready-to-serve
Salad Dressings, Mayo, Toppings
Seafood - Canned
Shortening, Oil
Snacks
Soft Drinks: Non-carbonated
Soup
Spices, Seasoning, Extracts
Sugar, Sweeteners
Table Syrups, Molasses
Tea
Vegetables - Canned
Vegetables And Grains - Dried

Table A.3: Different Quantity Definitions

	(1)	(2)	(3)	(4)	(5)	(6)
DV:	*count*	*count*	*oz*	*oz*	*count+oz*	*count+oz*
Two weeks	0.035	0.033	-0.358	-0.558	-0.323	-0.525
	(0.073)	(0.071)	(0.296)	(0.339)	(0.321)	(0.368)
One week	-0.030	-0.020	-0.043	-0.123	-0.073	-0.143
	(0.080)	(0.080)	(0.517)	(0.566)	(0.550)	(0.604)
Warned	0.150	0.125	6.108***	5.782***	6.258***	5.907***
	(0.202)	(0.204)	(1.312)	(1.252)	(1.347)	(1.287)
Hit	-1.187***	-1.193***	-19.605***	-19.481***	-20.792***	-20.674***
	(0.145)	(0.141)	(1.371)	(1.316)	(1.393)	(1.337)
Post	-0.351***	-0.354***	-4.838***	-4.921***	-5.189***	-5.275***
	(0.099)	(0.108)	(0.537)	(0.673)	(0.581)	(0.735)
Observations	8,941,166	8,941,166	8,941,166	8,941,166	8,941,166	8,941,166
Household FEs	X		X		X	
County FEs		X		X		X
Year FEs	X	X	X	X	X	X
Month FEs	X	X	X	X	X	X
Day-of-week FEs	X	X	X	X	X	X
Controls	X	X	X	X	X	X

Notes: This table replicates the regressions in Columns 1 and 3 of Table 2. The outcome is the purchase quantity measured in count in Columns 1-2 and the purchase quantity in ounce or flow ounce in Columns 3-4. Columns 5-6 are the same as Columns 1 and 3 in Table 2. Standard errors clustered at the county level are in parentheses. * p<0.10, ** p<0.05, *** p<0.01

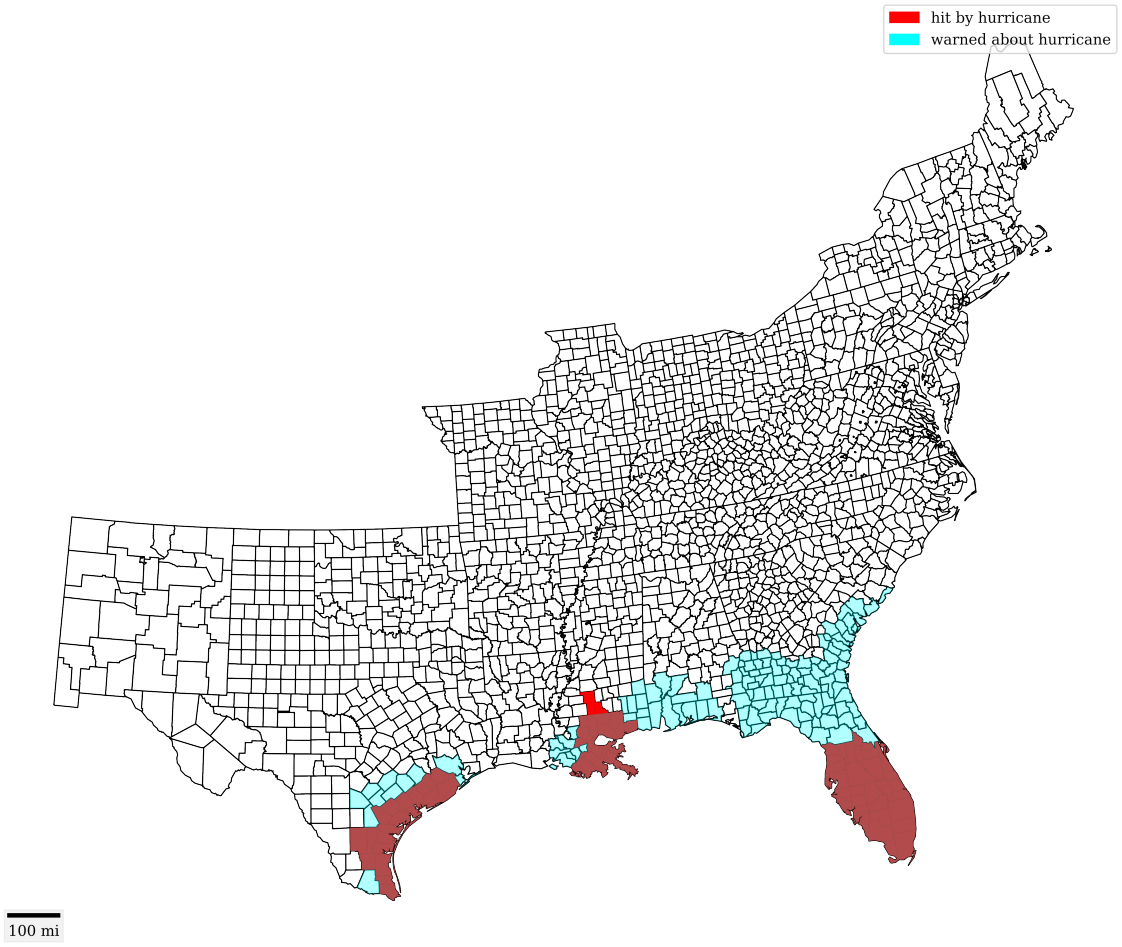


Figure A.2: Variation in counties that were hit and/or warned against a hurricane for the Atlantic Coast in 2017. For an interactive version of this graph, you can visit https://ernbilen.github.io/interactive_legend.

Table A.4: Summary Statistics at the County Level

	Non-Warned/Hit		Warned		Hit	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Demographics						
Household income, $	54,204.85	14,840.65	57,046.00	14,333.92	58,150.69	12,848.77
Household size	2.47	0.56	2.46	0.48	2.47	0.45
Married	0.68	0.20	0.68	0.20	0.67	0.17
Children present	0.24	0.18	0.24	0.16	0.25	0.15
Over-65	0.27	0.19	0.30	0.18	0.29	0.16
Black	0.10	0.18	0.16	0.19	0.18	0.19
No internet	0.14	0.15	0.10	0.12	0.09	0.09
College graduate	0.45	0.22	0.46	0.21	0.47	0.19
Purchases, All Emergency						
Quantity, oz or fl oz	46.59	17.52	42.77	13.24	41.93	11.60
Quantity, ct	2.36	1.57	2.47	1.62	2.35	1.28
Expenditure, $	4.09	1.22	3.94	0.96	3.91	0.85
Purchases, Perishable						
Quantity, oz or fl oz	14.51	5.99	13.30	4.67	12.95	3.74
Quantity, ct	0.16	0.15	0.19	0.15	0.18	0.12
Expenditure, $	1.49	0.52	1.58	0.49	1.58	0.43
Shopping activity						
Prop. of days with a trip	0.20	0.05	0.20	0.04	0.20	0.03
Avg. number of households		43.65		75.48		85.12
Number of counties		611		512		367

Notes: Data is arranged by county. The sample was trimmed using propensity score, and covers all hurricane-related hits or warnings between 2008 and 2018. Columns 1-2 restrict the sample to counties that were never hit by a hurricane nor received any warning during the sample years; Columns 3-4 restrict to counties that received a warning at least once; Columns 5-6 restrict to counties that were hit by a hurricane at least for once. "Quantity" and "Expenditure" refer to purchases of bottled water and other drinks, non-perishable foods, flashlights, batteries, and first aid supplies, with a full list included in Table A.2. Perishable items include dairy products, milk, eggs, fresh meat, and fresh produce. Household income and expenditure are adjusted for inflation using 2008 as the base year.

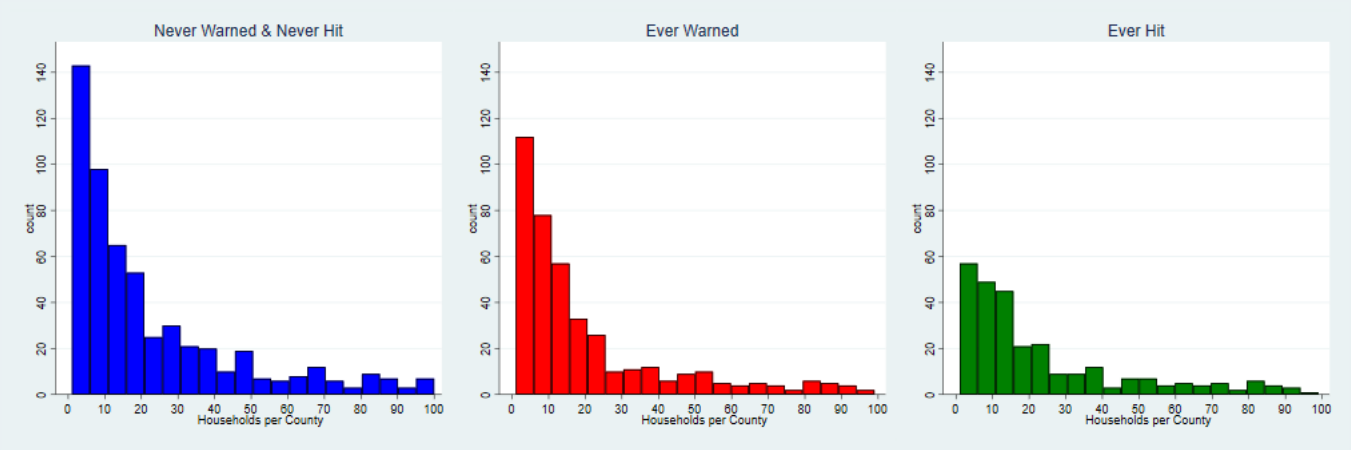
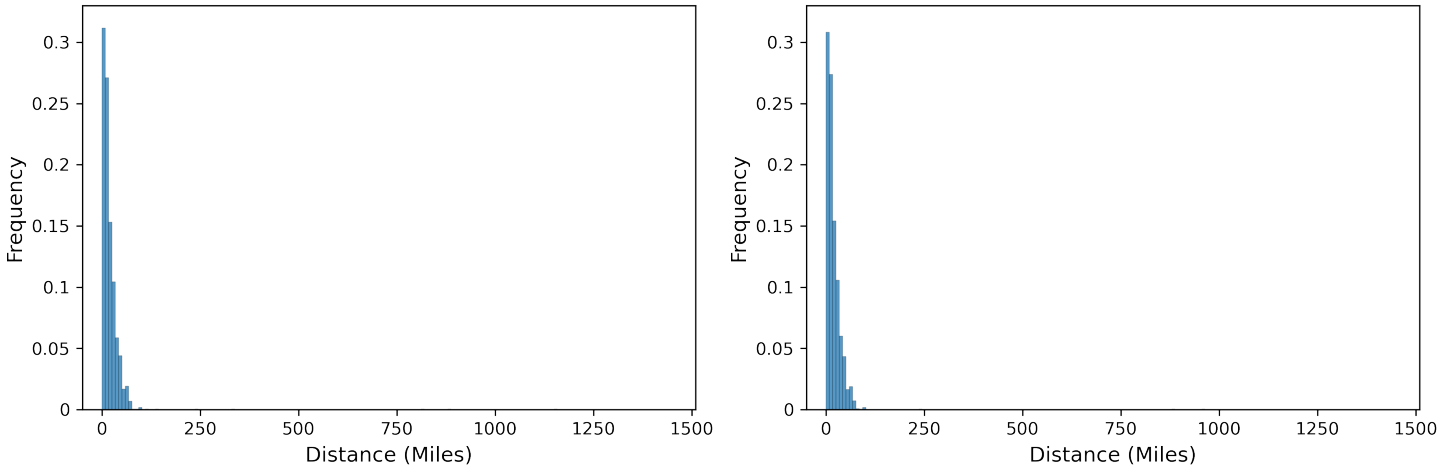


Figure A.3: Distribution of the number of households per county by warning & hit status



(a) Trips 6-8 weeks before warning
mean: 28.36, median: 14.29, skewness: 12.06

(b) Trips 0-2 weeks before warning
mean: 26.32, median: 14.32, skewness: 12.91

Figure A.4: Distribution of shopping trips in miles 6-8 weeks and 0-2 weeks prior to receiving a hurricane warning. The distributions are at the household-trip level. There is no statistically significant difference between the two distributions at the 5% level. (KS = 0.0050, p-value=0.1013)

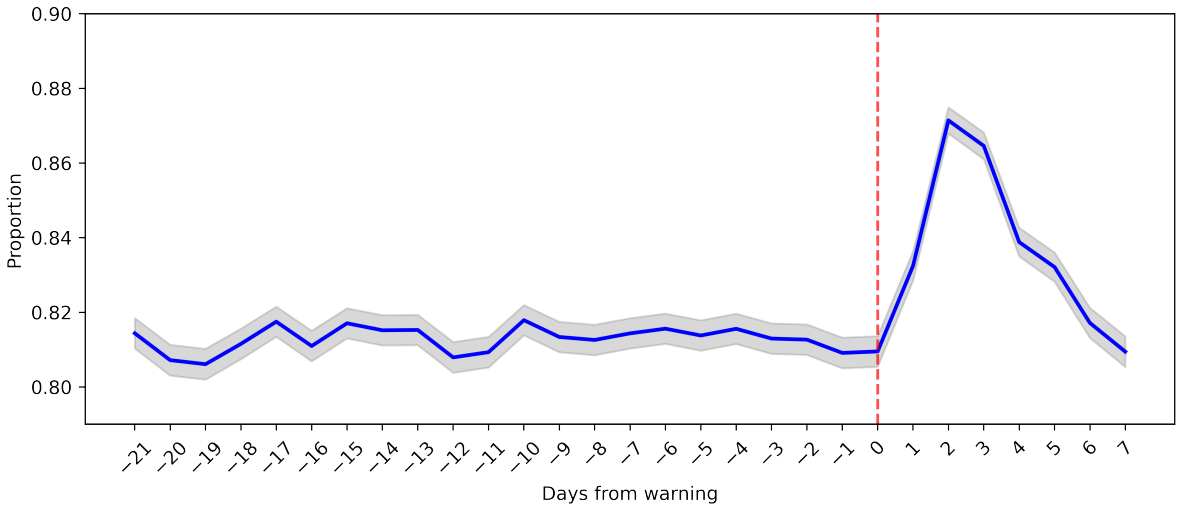
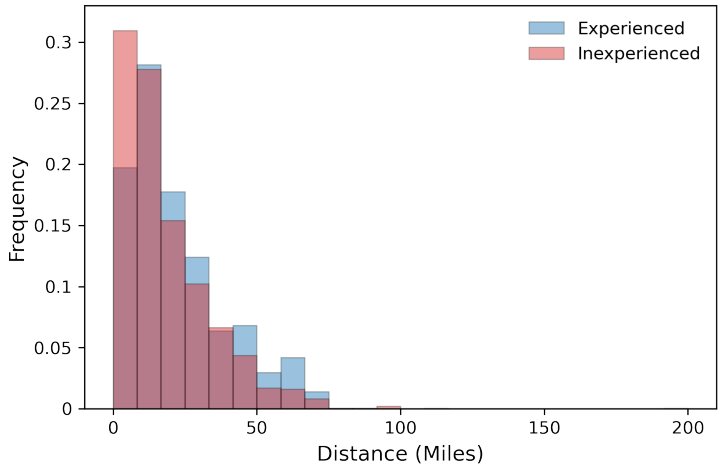


Figure A.5: Proportion of households who reported no shopping trips days before and after a hurricane warrning.



Experienced households: mean: 30.55, median: 18.06, skewness: 10.20
Inexperienced households: mean: 25.99, median: 14.01, skewness: 13.07

Figure A.6: Distribution of shopping trips in miles 0-2 weeks prior to receiving a hurricane warning by prior-year hurricane experience. The distributions are at the household-trip level. There is statistically significant difference between the two distributions at the 5% level. (KS = 0.1297, p-value<0.05)

Table A.5: Alternative Warning Area Definitions Including a Buffer

DV: Expenditure	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	0-mile		10-mile		50-mile		100-mile	
Two weeks	-0.495	0.02	-0.518	0.018	-0.458	0.025	-0.423	0.03
	(0.384)	(0.029)	(0.385)	(0.029)	(0.385)	(0.029)	(0.389)	(0.029)
One week	-0.592	0.049	-0.601	0.049	-0.578	0.052	-0.59	0.051
	(0.612)	(0.057)	(0.612)	(0.057)	(0.612)	(0.057)	(0.615)	(0.057)
Warned	7.153	0.774***	6.052	0.699***	5.259	0.637***	4.55	0.571***
	(1.361)	(0.106)	(1.266)	(0.103)	(0.904)	(0.076)	(0.739)	(0.060)
Hit	-21.388	-2.124***	-21.508	-2.144***	-21.691	-2.172***	-21.876	-2.201***
	(1.474)	(0.132)	(1.468)	(0.131)	(1.426)	(0.128)	(1.463)	(0.134)
Post	-4.735	-0.338***	-4.754	-0.339***	-4.867	-0.352***	-4.952	-0.362***
	(0.840)	(0.072)	(0.840)	(0.072)	(0.862)	(0.074)	(0.880)	(0.077)
Experience 1-year		-0.125**		-0.122**		-0.104*		-0.090*
		(0.054)		(0.054)		(0.053)		(0.054)
Two weeks×Experience 1-year		-0.054		-0.056		-0.078		-0.093
		(0.084)		(0.083)		(0.084)		(0.084)
One week×Experience 1-year		0.483***		0.479***		0.460***		0.453***
		(0.119)		(0.119)		(0.119)		(0.119)
Warned×Experience 1-year		-1.389***		-1.440***		-1.587***		-1.508***
		(0.271)		(0.257)		(0.213)		(0.158)
Hit×Experience 1-year		0.264		0.272		0.395		0.577**
		(0.325)		(0.323)		(0.293)		(0.287)
Post×Experience 1-year		-0.585***		-0.571***		-0.527***		-0.487***
		(0.163)		(0.163)		(0.162)		(0.169)
County FEs	X	X	X	X	X	X	X	X
Observations	8,941,166	8,941,166	8,941,166	8,941,166	8,941,166	8,941,166	8,941,166	8,941,166

Notes: Data is arranged by household-day.Columns 1 and 2 are replicate Tables 2 and 3 and include no buffer-zone. Columns 3 and 4 include a 10-mile buffer-zone around each polygon-area that was issued a hurricane warning; Columns 5 and 6 include a 50-mile buffer-zone; Columns 7 and 8 include a 100-mile buffer-zone. Standard errors clustered at county level are in parentheses. Controls are household income, household size, marital status, presence of children at household, female head of household, head of household $>$ 65 years of age, indicator for Black, indicator for no internet at the household, a year trend, month fixed effects, and day-of-week fixed effects. * p<0.10, ** p<0.05, *** p<0.01

Table A.6: Inverse Hyperbolic Sine of Outcomes

DV: arsinh(*Expenditure*)	(1)	(2)
Two weeks	-0.002	-0.001
	(0.003)	(0.003)
One week	-0.003	-0.005
	(0.005)	(0.005)
Warned	0.033***	0.047***
	(0.011)	(0.012)
Hit	-0.305***	-0.303***
	(0.014)	(0.017)
Post	-0.076***	-0.065***
	(0.007)	(0.009)
Experience 1-year		-0.005
		(0.007)
Two weeks×Experience 1-year		-0.022**
		(0.010)
One week×Experience 1-year		0.031**
		(0.014)
Warned×Experience 1-year		-0.147***
		(0.036)
Hit×Experience 1-year		-0.001
		(0.041)
Post×Experience 1-year		-0.102***
		(0.025)
County FEs	X	X
Observations	8,941,166	8,941,166
AIC	18,316,835	18,316,612
BIC	18,317,011	18,316,869

Note: This table replicates the regressions in Column 4 of Tables 2 and 3, using the inverse hyperbolic sine of expenditure as the outcome. Standard errors clustered at the county level are shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table A.7: Heterogeneous Effects of Experience by Internet Access at Home

DV: Expenditure			
Variable	Coefficient	Variable	Coefficient
Two weeks	0.036	Two weeks×No Internet	-0.168**
	(0.030)		(0.077)
One week	0.077	One week×No Internet	-0.281***
	(0.058)		(0.088)
Warned	0.844***	Warned×No Internet	-0.642**
	(0.124)		(0.319)
Hit	-2.157***	Hit×No Internet	0.413*
	(0.134)		(0.212)
Post	-0.328***	Post×No Internet	-0.107
	(0.073)		(0.124)
Experience 1-year	-0.118**	Experience 1-year×No Internet	-0.082
	(0.056)		(0.166)
Two weeks×Experience 1-year	-0.112	Two weeks×Experience 1-year×No Internet	0.840**
	(0.086)		(0.396)
One week×Experience 1-year	0.517***	One week×Experience 1-year×No Internet	-0.682*
	(0.122)		(0.353)
Warned×Experience 1-year	-1.568***	Warned×Experience 1-year×No Internet	2.341***
	(0.277)		(0.882)
Hit×Experience 1-year	0.300	Hit×Experience 1-year×No Internet	-0.539
	(0.330)		(0.369)
Post×Experience 1-year	-0.616***	Post×Experience 1-year×No Internet	0.462
	(0.173)		(0.365)
No Internet	-0.470***		
	(0.047)		
County FEs			X
Observations			8,941,166

Note: This table presents the estimated coefficients for a regression with household expenditure as the outcome, distinguishing the effects of hurricane experience on households with and without internet access. Standard errors clustered at the county level are shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table A.8: Purchases Excluding Bottled Water, Flashlight & Batteries

DV: Expenditure	(1)	(2)
Two weeks	0.017	0.022
	(0.029)	(0.029)
One week	0.071	0.040
	(0.054)	(0.056)
Warned	0.554***	0.684***
	(0.100)	(0.105)
Hit	-2.043***	-2.066***
	(0.117)	(0.131)
Post	-0.437***	-0.371***
	(0.061)	(0.070)
Experience 1-year		-0.107*
		(0.055)
Two weeks×Experience 1-year		-0.076
		(0.084)
One week×Experience 1-year		0.418***
		(0.113)
Warned×Experience 1-year		-1.392***
		(0.261)
Hit×Experience 1-year		0.263
		(0.320)
Post×Experience 1-year		-0.606***
		(0.159)
County FEs	X	X
Observations	8,941,166	8,941,166

Notes: This table replicates the regressions in Column 4 of Tables 2 and 3. The outcome is expenditures on emergency items excluding bottled water, batteries, and flashlights. Standard errors clustered at the county level are shown in parentheses.
* p<0.10, ** p<0.05, *** p<0.01

Table A.9: Purchase of Perishable Food

DV: Expenditure	(1)	(2)
Two weeks	0.082***	0.097***
	(0.021)	(0.020)
One week	0.008	0.033
	(0.033)	(0.032)
Warned	-0.206***	-0.129**
	(0.051)	(0.053)
Hit	-0.848***	-0.847***
	(0.060)	(0.071)
Post	-0.307***	-0.237***
	(0.047)	(0.055)
Experience 1-year		-0.033
		(0.086)
Two weeks×Experience 1-year		-0.232**
		(0.102)
One week×Experience 1-year		-0.378***
		(0.131)
Warned×Experience 1-year		-0.884***
		(0.147)
Hit×Experience 1-year		0.089
		(0.164)
Post×Experience 1-year		-0.687***
		(0.169)
County FEs	X	X
Observations	8,941,166	8,941,166

Note: This table replicates the regressions in Columns 4 of Tables 2 and 3, using the expenditure on perishable food as the outcome. Perishable items include dairy products, milk, eggs, fresh meat, and fresh produce. Standard errors clustered at the county level are shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table A.10: Heterogeneous Effects by Demographics

DV: Expenditure	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full sample	*Black*	*Hispanic*	*Age <40*	*Age >65*	*Non-metro*	*Metro*	*College*
Two weeks	0.024	0.010	-0.136	-0.058	-0.004	-0.062	0.025	0.027
	(0.029)	(0.060)	(0.102)	(0.071)	(0.043)	(0.080)	(0.031)	(0.041)
One week	0.047	-0.046	-0.192	-0.089	0.047	-0.097	0.057	0.099
	(0.058)	(0.103)	(0.125)	(0.100)	(0.064)	(0.093)	(0.065)	(0.076)
Warned	0.840***	1.122***	0.935***	0.940***	0.319	0.647**	0.877***	0.814***
	(0.102)	(0.224)	(0.293)	(0.255)	(0.205)	(0.297)	(0.108)	(0.192)
Hit	-2.098***	-1.728***	-1.939***	-2.019***	-1.849***	-2.287***	-2.081***	-2.095***
	(0.135)	(0.253)	(0.336)	(0.200)	(0.159)	(0.237)	(0.148)	(0.178)
Post	-0.338***	0.043	-0.413**	-0.371***	-0.291***	-0.619***	-0.306***	-0.277***
	(0.074)	(0.219)	(0.193)	(0.137)	(0.080)	(0.142)	(0.083)	(0.090)
Experience 1-year	-0.138**	-0.186*	-0.037	-0.139	-0.240**	-0.008	-0.136**	-0.148**
	(0.057)	(0.108)	(0.111)	(0.134)	(0.110)	(0.167)	(0.064)	(0.067)
Two weeks×Experience 1-year	-0.050	0.211	-0.872***	-0.289	0.029	0.143	-0.063	-0.023
	(0.085)	(0.268)	(0.164)	(0.215)	(0.136)	(0.344)	(0.087)	(0.108)
One week×Experience 1-year	0.492***	0.189	0.664***	0.432*	0.733***	0.624*	0.469***	0.628***
	(0.119)	(0.304)	(0.255)	(0.232)	(0.257)	(0.346)	(0.127)	(0.159)
Warned×Experience 1-year	-1.450***	-1.213***	-1.707***	-2.020***	-0.573	-2.672***	-1.373***	-1.381***
	(0.264)	(0.411)	(0.475)	(0.668)	(0.443)	(0.755)	(0.271)	(0.317)
Hit×Experience 1-year	0.238	-0.994*	0.023	0.417	0.192	0.813**	0.205	0.173
	(0.325)	(0.562)	(0.423)	(0.568)	(0.285)	(0.383)	(0.327)	(0.397)
Post×Experience 1-year	-0.573***	-0.478	-0.816***	-1.069***	-0.279	0.544	-0.689***	-0.673***
	(0.164)	(0.306)	(0.312)	(0.237)	(0.215)	(0.420)	(0.172)	(0.183)
County FEs	X	X	X	X	X	X	X	X
Observations	8,608,473	1,289,411	514,613	1,375,186	2,375,730	1,463,760	7,144,713	4,750,528

Note: This table replicates the regressions in Column 4 of Table 3 for different demographic groups. Standard errors clustered at the county level are shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01