Protective Action and Evacuation Reponses During Hurricane Katrina: A Gendered Analysis

Student Investigator: Michelle Dovil, MA

NOAA Center for Atmospheric Sciences at Howard University

Abstract

- The purpose of this study was to assess the degree to which the Protective Action Decision Model (PADM) can be utilized to explain risk communication and protective action behaviors as it relates to gender.
- This study assessed the influence of informational warnings, protective action recommendations, and receiver characteristics on the protective actions by men and women during Hurricane Katrina using the PADM.

Research Questions

RQ1: What is the impact of informational warnings on the protective actions taken by men compared to women during Hurricane Katrina?

RQ2: What is the impact of protective action recommendations on the protective actions taken by men compared to women during Hurricane Katrina?

RQ3: Does receiver characteristics such as age, marital status, dependent(s) status, employment status, and home financial status impact men and women's decisions to take protective actions differently?

Research Questions

RQ4: Does gender play a significant role in evacuation responses during Hurricane Katrina?

RQ5: What variable(s) significantly influenced men and women's decisions to take protective action during Hurricane Katrina?

Significance of Study

Practical:

- In recent years we have seen an increase in the number of severe weather incidents, that has caused billions of dollars in damages along with thousands of deaths.

- It has been argued that society has become increasingly vulnerable to extreme weather (Kunkel et al., 1999). Hence, it is essential that accurate informational warnings and protective recommendations are disseminated to the public to mitigate potential dangers.

- It is also imperative that scientists are taking into account the social demographics of threaten population's that impact protective actions and evacuation responses.

- This study provides policy makers, governmental officials, and emergency managers with the information needed to appropriately communicate effective warning messages, improve protective action behaviors, and offer the appropriate assistance needed for those at risk, especially as it pertains to women.

Significance of Study

Theoretical:

- Test the effectiveness of using different components suggested in the PADM.
- Broaden this theory and several other disaster response models that attempt to examine how threaten populations take protective actions without assessing the role of gender.
- Extend existing literature on risk communication and disaster response, especially as it relates to gender

Review of Literature

Informational Warnings and Protective Actions

-Piotrowski and Armstrong (1998)found that the primary source for informational warning messages by college students and staff during Hurricane Danny were local television and radio stations.

-Perez-Lugo (2001) examined the influences of mass media outlets and resident's awareness and preparation for natural disasters in Puerto Rico. Results showed that contrary to previous studies, participants took little to no protective actions due the lack of efficiency from media outlets and inconsistency of information from warnings and reports.

Review of Literature

Informational Warnings and Protective Actions

-Vihalemm, Kiisel, and Harro-Loit (2012) examined citizens response patterns to warning messages in Parnu, Tallinn, Tartu, and Narva that contained 67 participants in all. and found that contrary to other studies on crisis communication many of the participants would not seek additional information from community members because they believed that friends or neighbors have the potential to spread rumors or falsify important information. Results also showed that disseminating warning messages repeatedly were very effective in motivating disaster response, as some of their participants did not take the warning messages serious at first.

Review of Literature

Receiver Characteristics and Protective Actions

-Elliot and Pais (2006) examined race and class differences of the disaster responses from New Orleans victims after the storm. Researchers found that household income played a strong and consistent role in predicting evacuation timing from the city.

-Shakey (2007) examined the race, age, and the location of 555 victims, who were classified as deceased after Hurricane Katrina. He found that old age was the most significant variable in those who died due to Hurricane Katrina.

-Zoraster (2010) examined the risk factors vulnerable populations are exposed to in regards to natural hazards. Results showed that socio-economic barriers, language barriers, lack of trust in governmental authorities, and lack of access to vehicles all were important factors in the disaster preparation and evacuation activities for vulnerable populations that included the poor, minorities, and the elderly.

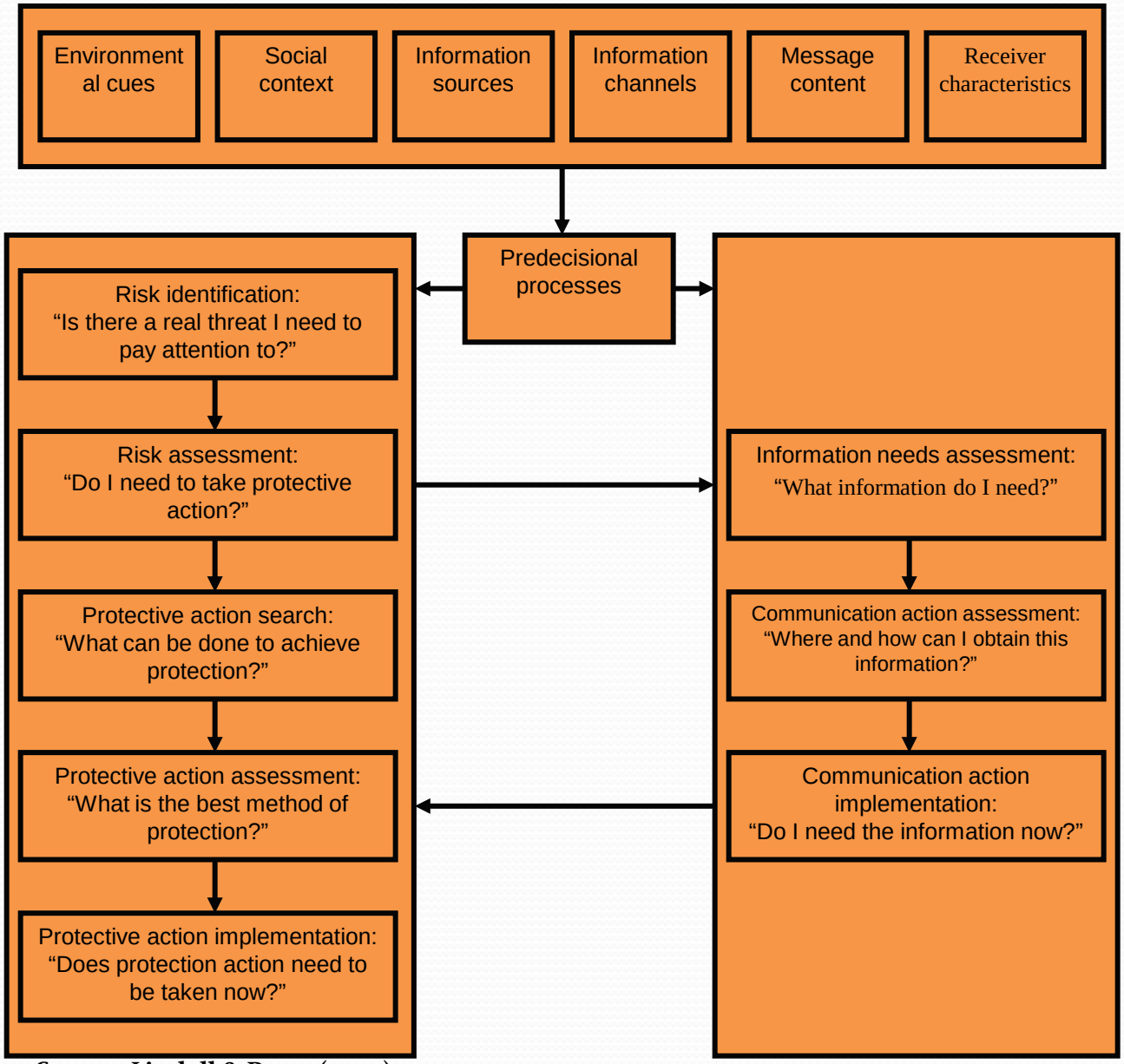
Review of Literature

Gender and Protective Actions

-Bateman, Julie, and Edwards (2002) examined the evacuation responses of both males and females during Hurricane Bonnie. Survey participants who were exposed to the storm were asked a series of questions consisting of social demographics, risk perceptions, and decisions to evacuate. The study found that women were more likely than men to evacuate based on a number of variables.

-Neumater and Plumper (2007) examined the gender dynamics involved in natural disasters. Researchers examined the mortality rates of both men and women between 1981-2002. Researchers found that women were more likely to die than men during severe disasters. They also found that the socioeconomic status of women played a significant role in the mortality rates of women.

Theoretical Framework - PADM



Source: Lindell & Perry (2004).

Methodology

Data

-Provided by the Resource Center for Minority Data through the Interuniversity Consortium for Political and Social Research.

-Multiple-frame sample design (telephone surveys)

-1043 participants; who were English-speaking adults that were 18 years or older; lived in Alabama, Louisiana, and Mississippi before Hurricane Katrina made landfall

Statistical Analysis

-Frequency distributions for social demographics

-Correlation Matrix to test correlations between variables

-Logistic regressions for testing independent and dependent variables

Socio-Demographic Characteristics of Sample

Demographic Category		N	%
Gender			
	Female	564	54.1
	Male	479	45.9
Race/Ethnicity			
	Whites	707	67.8
	African Americans	270	25.9
	Hispanics	35	3.4
	Others	31	3.0
Age			
	18-24	51	4.9
	25-36	197	19.0
	37-46	223	21.5
	47-56	270	26.0
	57-64	142	13.7
	65 and older	156	15.0
Income			
	Less than 20k	229	23.9
	21-40k	262	27.3
	41-80k	280	29.2
	More than 80k	188	
Marital Status			
	Married	574	55
	Separated	44	4.2
	Widowed	76	7.2
	Divorced	153	14.6
	Never Married	192	18.5
	Cohabitating	69	6.6
Dependents in Household			
	0	171	16.4
	1	314	30.1
	2	186	17.9
	3	208	19.9
	4	113	10.8
	5	29	2.8
	6	12	1.2
	7	3	.3
	8	3	.3
	10	4	.4
Employment Status			
	Employed	562	53.9
	Unemployed	480	46.1
Homeownership			
	Owns Home	774	75.2
	Does Not Own Home	255	24.8

Findings

- **RQ1: What is the impact of informational warnings on the protective actions taken by men and women during Hurricane Katrina?**

	PAFood/Water			PASupplies			PAMedicine			PAEvacuationPlan		
	B	Sig	Exp(B)	B	Sig	Exp(B)	B	Sig	Exp(B)	B	Sig	Exp(B)
Females	.000	**.024***	1.000	.000	**.044***	1.000	.000	.415	1.000	.000	.811	1.000
Males	.000	.762	1.000	.000	.098+	1.000	.000	.015	1.000	.000	.712	1.000

+P<.10
*P<.05
**P<.001

According to the beta scores informational warnings were only significant for packing food and water up to three days and packing supplies. However there was no difference found between men and women.

RQ2: What is the impact of protective action recommendations on the protective actions taken by men and women during Hurricane Katrina?

	PAFood/Water			PASupplies			PAMedicine			PAEvacuationPlan		
	B	Sig	Exp(B)	B	Sig	Exp(B)	B	Sig	Exp(B)	B	Sig	Exp(B)
Females	.009	**.005***	1.009	.008	**.044***	1.008	.015	.415	1.000	.003	.230	1.003
Males	.010	.010+	1.010	.005	.274	1.005	.007	.227	1.007	.003	.331	1.003

+P<.10
*P<.05
**P<.001

According to the beta scores protective action recommendations were only significant for packing food and water up to three days and packing supplies. However, the differences between women and men were very small.

RQ3: Does receiver characteristics such as race/ethnicity, age, household income, marital status, dependent(s) status, employment status, and home financial status impact men and women's decisions to take protective action?

Females

	PAFood/Water			PASupplies			PAMedicine			PAEvacPlan		
	B	Sig	Exp (B)	B	Sig	Exp (B)	B	Sig	Exp (B)	B	Sig	Exp (B)
White	-1.213	.279	.297	-.794	.489	.452			.000	-.068	.939	.935
AfricanA	-1.448	.202	.235	-1.209	.297	.299			.000	-.814	.365	.443
Hispanic	-.956	.470	.385	.065	.967	1.067	.879	1.000	2.409	1.119	.414	3.061
Other	.968	.397	2.633	.558	.633	1.746				1.450	.206	4.263
Age	.002	.862	1.002	.020	**.081+**	1.020	.030	**.043***	1.031	.002	.829	1.002
HHIncome	-.038	.745	.962	-.029	.827	.971	-.105	.541	.900	.168	.164	1.183
Married	.254	.450	1.290	.776	**.030***	2.173	.590	.191	1.804	.210	.532	1.234
Separated	.595	.247	1.812	.636	.235	1.890	.066	.919	1.068	-.139	.767	.870
Widowed	.438	.378	1.550	.139	.793	1.149	-.506	.467	.603	.175	.721	1.192
Divorced	.092	.794	1.096	.901	**.022***	2.463	.086	.852	1.090	.428	.236	1.534
Cohabitat	.430	.354	1.537	.382	.440	1.465	.385	.523	1.470	.328	.470	1.388
Dependent	.125	.134	1.134	.136	.139	1.146	.177	.134	1.193	.135	**.099+**	1.145
EmploySta	.158	.493	1.172	.208	.424	1.231	-.272	.420	.762	.065	.784	1.068
HomeOwn	-.273	.336	.761	-.240	.441	.786	-.206	.593	.814	-.042	.880	.959

+P<.10
*P<.05
**P<.001
Blank space: Not enough cases

Males

	PAFood/Water			PASupplies			PAMedicine			PAEvacPlan		
	B	Sig	Exp (B)	B	Sig	Exp (B)	B	Sig	Exp (B)	B	Sig	Exp (B)
White	.051	.942	1.052	1.263	.133	3.535	-.006	.996	.994	.302	.668	1.353
AfricanA	-.310	.671	.733	1.253	.153	3.499	-.346	.773	.707	-.213	.771	.808
Hispanic	-.798	.361	.450	1.600	.162	4.951				.685	.474	1.984
Other	.491	.451	1.634	1.483	.212	4.405	.362	.750	1.437	.276	.675	1.318
Age	.002	.877	1.002	.017	.207	1.017	.009	.578	1.009	.000	.989	1.000
HHIncome	-.080	.527	.923	.126	.476	1.134	-.149	.508	.862	-.047	.732	.954
Married	-.661	**.101+**	.516	.370	.430	1.448	.984	**.090+**	2.676	.405	.325	1.499
Separated	-.253	.752	.776	.861	.453	2.366	.609	.624	1.839	-.683	.375	.505
Widowed	-.694	.376	.500	-.574	.550	.563				-.625	.425	.535
Divorced	-.997	**.029***	.369	.224	.679	1.252	-.685	.263	.504	-.340	.463	.712
Cohabitat	.123	.811	1.131	-.861	.116	.423	.921	.191	2.511	.540	.306	1.716
Dependent	-.008	.925	.992	-.023	.825	.977	-.330	**.006***	.719	-.133	.122	.876
EmploySta	.113	.650	1.120	-.034	.919	.966	.346	.392	1.414	.461	**.081+**	1.586
HomeOwn	.233	.457	1.263	.251	.522	1.285	.951	**.032***	2.589	.118	.718	1.126

+P<.10
*P<.05
**P<.001
Blank space: Not enough cases

RQ 3 (Continued)

- According to the beta scores there were no significant receiver characteristics when it came to packing food and water for women. However, receiver characteristics such as **age** (B=.020, with a significance level of .081), **being married** (B=.776, with a significance level of .030) and **divorced** (B=.901, with a significance of .022) were all strong predictors of women packing supplies.
- Additionally, when it came to preparing medicine, **age** (B=.030, with a significance level of .043) was a significant predictor for taking protective actions.
- As for the protective action, evacuation plan, the **number of dependents in a household** (B=.135, with a significance of .099) had the strongest impact on woman's decision to take that particular protective action.

RQ3 (Continued)

- According to the beta scores for men, **being married** (B=-.661, with a significance level of .101) and **divorced** (B=-.997, with a significance level of .029) were significant predictors for men not packing food and water. As the table shows an inverse relationship between the variables.
- According to the beta scores there were no significant receiver characteristics when it came to packing supplies for men. However, when it came to preparing medicine, **being married** (B=.984, with a significance level .090), **number of dependents in household** (B=-.330, with a significance level .006), and **homeownership** (B=.951, with a significance level of .032) were all strong predictors for men's decision to take that particular protective action.
- As for the protective action, evacuation plan the only significant predictor was **employment status** (B=.461, with a significance level .081).

RQ4: Does gender play a significant role in evacuation responses during Hurricane Katrina?

	Evacuation Reponses		
	B	Sig	Exp(B)
Gender	.223	.143	1.250
White	-.501	.318	.606
AfricanAmericans	-.777	.134	.460
Hispanic	-.038	.955	.963
Other	-.667	.149	.513
Age	.010	.145	1.010
HHIncome	.214	**.010+**	1.239
Married	.165	.500	1.179
Separated	-.278	.484	.758
Widowed	.313	.429	1.368
Divorced	.111	.682	1.117
Cohabitation	-.326	.307	.722
Dependents	-.099	**.082+**	.906
Employment Status	.370	**.023***	1.447
Home Ownership	-.159	.425	.853
InformationalWarnings	.000	**.011+**	1.000
Protective Action Recommendations	-.003	**.103***	1.250

+P<.10
*P<.05
**P<.001

According to the beta score (B=.223, with a significance level .143) gender was not a significant predictor for evacuation responses.

RQ5: What variable(s) significantly influenced men and women's decision to take protective action during Hurricane Katrina?

	PAFood/Water			PASupplies			PAMedicine			PAEvacPlan		
	B	Sig	Exp (B)	B	Sig	Exp (B)	B	Sig	Exp (B)	B	Sig	Exp (B)
Gender	.045	.772	1.046	-.431	**.024***	.650	-.012	.960	.988	.021	.899	1.021
White	-.420	.456	.657	.366	.568	1.442	-.649	.552	.523	.115	.833	1.121
AfricA	-.729	.207	.483	.124	.850	1.132	-1.120	.307	.326	-.525	.346	.592
Hispan	-.769	.267	.464	.932	.297	2.540				.775	.312	2.171
Other	.596	.277	1.815	1.124	.169	3.078	.804	.460	2.235	.652	.243	1.920
Age	-.001	.862	.999	.017	**.047***	1.017	.019	**.079+**	1.019	.000	.976	1.000
HHIncome	-.068	.425	.934	.025	.810	1.026	-.090	.497	.914	.066	.456	1.068
Married	-.136	.583	.873	.671	**.015+**	1.955	.712	**.038***	2.039	.335	.187	1.398
Separate	.333	.430	1.395	.723	.128	2.061	.343	.538	1.409	-.217	.577	.805
Widow	.042	.919	1.042	-.020	.965	.980	-.185	.763	.831	-.058	.885	.944
Divorce	-.358	.188	.699	.644	**.040***	1.904	-.235	.512	.790	.137	.625	1.147
Cohabit	.254	.444	1.290	-.182	.604	.833	.505	.247	1.657	.382	.254	1.466
Dependent	.052	.362	1.054	.060	.381	1.062	-.049	.539	.952	.013	.825	1.013
Employ Sta	.108	.513	1.114	.094	.640	1.099	-.067	.789	.935	.238	.170	1.268
HOwner	-.014	.945	.986	-.007	.978	.993	.301	.292	1.351	.051	.806	1.052
InformationalWarnings	.000	.117	1.000	.000	**.013***	1.000	.000	**.048***	1.000	.000	.935	1.000
ProtActRecom	.009	**.000****	1.009	.006	**.028***	1.006	.011	**.021***	1.011	.003	.129	1.003

+P<.10
*P<.05
**P<.001
Blank space: Not enough cases

According to the beta score the only significant predictor for packing food and water were **protective action recommendations** (B=.009, with a significance level .000). Additionally, receiver characteristics that were significant predictors for packing supplies were **gender** (B=-.431, with a significance level .024), **age** (B=.017, with a significance level .047), **being married** (B=.671 with a significance level .015), and **being divorced** (B=.644 with a significance level .040. **Informational warnings** (B=.000, with a significance level .013) and **protective action recommendations** (B=.006, with a significance level .028) were also significant predictors for packing supplies. Additionally, receiver characteristics that included **age** (B=.019, with a significance level .079); **being married** (B=.712, with a significance level .038); **Informational warnings** (B=.000, with significance level .048); and **protective action recommendations** (B=.011, with significance level .021) were all significant predictors in preparing medicine. There were no significant predictors for the protective action that consisted of having an evacuation plan.

Discussion

- Based on the demographics of the sample population from this study which consisted of predominantly white older women, a majority of whom were married, homeowners, and made well over $20,000 a year it is speculated that this could have significantly impacted the results of the study. It is very possible that this sample population did not have to encounter the social and economic barriers that were common to those left behind during Hurricane Katrina.
- Evacuation responses were also assessed during this study. Gender was especially examined to see if it would have any significant impact on whether or not an individual chose to evacuate prior to Katrina making landfall. It is important to note that an individual can take protective actions and not evacuate.
- It is also important to note that there were several interlocking variables such as race/ethnicity, class, gender, age, etc that all play an important role in not only how people internalized informational warnings but also how they decided to respond.
- From this study it is recommended that further research be done on gender and disaster response, with further analysis on deconstructing how we define gender as a constructed reality and how that affects how individuals respond to disasters.

Conclusions (continued)

- The goal of this research was to assess the degree to which the Protective Action Decision Model could be utilized to explain risk communication and protective action behaviors as it relates to gender. In so doing, this study assessed the impact of informational warnings, protective action recommendations, and receiver characteristics on the protective actions by men and women during Hurricane Katrina. The comparisons between men and women responses were tested through four different protective action recommendations.
- Results from this study revealed that gender did not have a significant impact on taking protective actions. Although women were more likely to take protective actions than men, in some cases the differences were not that significant.
- However, results from this study were consistent with the PADM in assessing protective actions based on informational warnings, protective action recommendations, and some receiver characteristics as all three components were found to be significant in relation to at least half of the protective actions recommended.
- Through the sponsorship of NCAS the social scientist (Dr.Adams, Dr.Tyree, Dr.Stroman, and myself will continue our research on the relationship between social demographics and protective action behaviors in hopes of better preparing and mitigating at-risk populations throughout future disasters.

Thank you all for your time