AN EMPIRICAL INVESTIGATION OF RUMORING: ANTICIPATING DISASTER UNDER CONDITIONS OF UNCERTAINTY

James M. Dahlhamer and Joanne M. Nigg
Disaster Research Center and Department of Sociology
University of Delaware

Paper presented at the annual meetings of the Southern Sociological Society, Chattanooga, TN April, 1993.

AN EMPIRICAL INVESTIGATION OF RUMORING: ANTICIPATING DISASTER UNDER CONDITIONS OF UNCERTAINTY

James M. Dahlhamer and Joanne M. Nigg
Disaster Research Center and Department of Sociology
University of Delaware

ABSTRACT

Although a great deal of attention has been given to the conditions which give rise to rumors, the conditions necessary for transmission, and processes of rumor transmission, little attention has been paid to the factors that distinguish between rumorers and non-rumorers, as well as rumor believers and non-believers. Employing data from a survey of Los Angeles residents following a widely-felt, but non-damaging earthquake that occurred during a heightened period of public attention to earthquake prediction, this analysis focuses on the linkages between a number of social and contextual factors to identify rumorers and rumor believers.

Since scientific earthquake prediction is still a developing field (Lindh, 1991), the general public often has to interpret complex scientific information relating to earthquake forecasting in meaningful ways in order to decide upon action alternatives. Often, competing definitions of earthquake predictions circulate within the same social circles, producing uncertainty and ambiguity about the likelihood of a future earthquake. In such situations, widespread rumoring has been found to occur (Turner, Nigg, & Paz, 1986; Edwards, 1991; Tierney, forthcoming).

For purposes of this paper, ***rumoring*** is defined as a collective process that arises when adequate information is unavailable, from formal or legitimate sources, to interpret a problematic situation or event. This definition follows from the sociological approach to rumoring developed by Shibutani (1966), Turner and Killian (1957), and other collective behaviorists (cf, Lang and Lang, 1961; Smelser, 1962). From this perspective, rumoring develops when an unusual, unexpected, or unfamiliar event is ambiguous; when an interpretation is needed to allow people to determine whether and how they should act.

This approach has been contrasted with that deriving from the psychological tradition developed by Allport and Postman (1947) that treats rumor as the content of a serially-transmitted message of false information. However, Allport and Postman did identify two necessary conditions for the occurrence of a rumor: the theme of the rumor must have some importance to the hearer; and the facts must be shrouded in some kind of ambiguity. The intensity of the rumor, then, is a combination of the importance of the subject to the individual and the ambiguity of the evidence, their "basic law of rumor".

In their analysis of rumoring related to earthquake threat episodes, Turner, Nigg, and Paz (1986) attempted to synthesize these two approaches. They viewed rumor as an extension of the information seeking process and tested both Shibutani's definition of rumor as well as Allport and Postman's "basic law of rumor" by developing a four-level scale of rumoring.

The first stage--the lowest level of rumoring--of the scale consists of reading or hearing about the disaster threat from the media without discussion with anyone else or, in some instances, learning of the threat from informal discussion with family or friends. The second stage, a "major step up the scale," involves supplementing media-related information with informal discussion in order to "sift, clarify, and confirm understandings from the media" (Turner, Nigg, & Paz, 1986:106). A third step expands the activities in stage two with inquiries directed to authorities or others considered knowledgeable about the extent of earthquake threat at the current time. The final stage--affirmative rumoring--occurs when informal discussion produces scenarios that are distinct from any obvious media sources and inquiries to authorities are centered on these scenarios rather than on media reports. Affirmative rumoring is differentiated from information seeking on the grounds that rumoring episodes, unlike information seeking, are not directly stimulated by media attention to a prediction event.

The authors drew upon "the theory of rumor" to explain each step up the scale. For example, Shibutani's definition of rumor "applies as much to the sifting of media content through informal discussion as it does to affirmative rumoring" (Turner, Nigg, & Paz, 1986:107). Strong support for the applicability of Allport and Postman's "basic law of rumor" in predicting movement up the scale was, however, not found. Increases in importance and ambiguity, while necessary for lower levels of information seeking,

were not associated with affirmative rumoring. In discussing movement up the scale, they argue:

> [the] topic must be both important and ambiguous to stimulate either informal discussion to sift media communication or escalated forms of information seeking. But the concepts of importance and ambiguity are of little help in determining when active information seeking will occur. In order for the threshold between informal discussion of media communication and active information seeking to be crossed, the following three factors must exist: a certain level of comprehension of the message; specificity concerning the time and place of the threat; and authentication of the message (Turner, Nigg, & Paz, 1986:111).

Affirmative rumoring, stage four, takes place when authentication and comprehension of the threat are at a high level and expectation and concern are aroused, but the media no longer provides current material for the focus of informal discussion or for direct inquiries to authorities.

While it is apparent that substantial work has been done on the contextual factors that influence the emergence of rumoring--importance of the topic and ambiguity of the information--and on factors that influence the rumoring process--interaction with members in one's social circle and access to media information on the topic--very little work has been done on the question: "Who is involved in the rumoring process?" Theoretically, we seem to have an understanding of "when" and "why" such collective episodes occur; but little about the human component of that collectivity.[1]

---

[1] Although a recent issue of the French journal, Communication, focused on rumors and rumorers, this issue was unavailable in the United States at the time this paper was written.

This paper will begin to address the question of what types of people engage in rumoring by looking at the response of Southern California residents to a non-damaging, yet widely discussed earthquake.

The New Year's Day Earthquake

At 3:14 p.m. on January 1, 1979, a 4.6 magnitude earthquake shook the greater Los Angeles area. The tremor, described as "moderate," was felt as far south as San Diego and north to Santa Barbara. The quake was centered in the ocean floor about four miles south of Malibu in Santa Monica Bay. Only minor damage was reported; no injuries were recorded for this quake. It was reported that fire, police, and newspaper switchboards as far inland as Riverside and San Bernardino were swamped with calls "ranging from the curious to the fearful." The quake was felt and commented upon by sports reporters in the press box at the Rose Bowl in Pasadena where the USC-Michigan game was in progress.

This event occurred following a three year period during which Southern California had been exposed to very high levels of media attention to the developing science of earthquake prediction, as well as to several well disseminated and highly discussed earthquake predictions from scientific, pseudoscientific, and prophetic sources. In general, the public's concern about experiencing a damaging earthquake had increased substantially during this period (Turner et al, 1986). On the day of the quake and for a day or two after the event, area newspapers carried

articles on the earthquake and its consequences; but this was very brief coverage compared to past events during the preceding three years.

The Survey

As part of an on-going study of community response to earthquake threat in California,[2] a contingency questionnaire and a sampling plan had previously been developed to investigate how people would interpret a non-damaging earthquake in light of past information on earthquake predictions or forecasts in the area.[3] Modest changes were made to the already-prepared questionnaires and interviewing began on January 8. Telephone interviews with 519 randomly selected respondents were completed by January 26.[4]

---

[2] These data were collected with funding from the National Science Foundation, grants NSF ENV76-24154 and PFR78-23887. Any opinions, findings, conclusions, or recommendations are those of the authors and do not necessarily reflect the views of the Foundation.

[3] The study itself consisted of five waves of interviews with randomly selected respondents throughout the Los Angeles area. The final wave of interviews had just been concluded in December, 1978. The study also allowed for other "contingency" events to take place which would automatically trigger a separate investigation--a new prediction; a heightened prediction; a withdrawal of a prediction; the disconfirmation of a prediction; and a damaging earthquake. During the study period, however, only the New Year's Day earthquake qualified as a contingency event.

[4] Interviews were conducted by staff from the Survey Research Center within UCLA's Institute for Social Science Research.

What Was Heard and Believed?

Although no formal scientific assessments of the meaning of this small earthquake were reported by the media, the investigators wanted to determine whether any rumoring was taking place about the meaning of this quake. Based on scientific discussions of the interpretations of other earthquake events, the investigators developed four possible interpretations that could have been given to this earthquake. These interpretations were presented to the respondents in the questionnaire: that it means a larger one won't occur; that it could be a sign a bigger one is coming soon; that this earthquake doesn't make any difference in whether a future earthquake will occur or not; and that this was an aftershock of an earlier local earthquake.

Despite the lack of information on these possibilities from media sources, some rumoring was obviously taking place in the community. Almost a third (N=218) of the respondents had heard some type of information about the import of this event for a predicted earthquake, and nearly 10% (N=50) had heard more than one such interpretation.

By far, the most frequently heard rumor (36%) was that this small earthquake could be a sign that a larger earthquake is coming soon. Each of the other rumored interpretations was only heard by 5-7% (Table 1). This rumor was also believed to be true by the largest number of people (N=47 or 26%). Even though fewer people had heard that this earthquake wouldn't have any effect on whether a future quake would occur or not, 26% (N=10) of them also believed

Table 1. Percentage Breakdowns of Rumors Heard, Rumors Believed, and Source of Rumors

	Rumor 1	Rumor 2	Rumor 3	Rumor 4[a]
Remember Rumor?				
Heard	7%	36%	7%	5%
Didn't Hear	91	62	90	93
Missing	2	2	2	2
Total	100% (N=519)	100% (N=519)	99%[1] (N=519)	100% (N=519)
Believe Rumor?				
Believe	14%	26%	26%	4%
Hedge	43	62	58	61
Disbelieve	43	12	16	35
Total	100% (N=37)	100% (N=184)	100% (N=38)	100% (N=26)
Source of Rumor:				
Formal	11%	6%	5%	27%
Informal	65	71	71	39
Family	*8*	*6*	*3*	*35*
Others	*57*	*65*	*68*	*4*
Don't Know	24	23	24	35
Total	100% (N=37)	100% (N=184)	100% (N=38)	101%[1] (N=26)

[a]Rumor 1: A larger earthquake won't occur.
Rumor 2: Earthquake could be a sign a bigger one is coming soon.
Rumor 3: This earthquake doesn't make a difference in whether a future earthquake will occur or not.
Rumor 4: This was an aftershock of an earlier local earthquake.
[1]Total percent does not equal 100% due to rounding.

this rumor. People generally rejected the idea that this was an aftershock or that it meant no larger earthquake was likely to occur. Overwhelmingly, the respondents said that the source of the rumors they heard, regardless of which one(s) they heard, was informal; that is, from friends and co-workers.

Who Heard and Believed These Rumors?

The coding scheme for the independent and intervening variables chosen for inclusion in our models of rumorers is presented in Table 2. The independent variables represent three blocks of variables: socio-demographic (age, sex, ethnicity, education, income, number of children in the home); attachment to community (community as a "real home," years of residence in the community); and past experience (number of earthquakes experienced).

The intervening variables in the models fall into three blocks: communication (whether they attempted to make any formal or informal contacts following the quake to get more information); variables that give any indication of the respondent's level of awareness of earthquake precursors (knowledge of and belief in the Palmdale bulge as a precursory phenomenon; premonition that this earthquake would happen; belief in folk signs to tell when an earthquake is coming; belief in scientific accuracy to predict earthquakes); and earthquake concern indicators (fear of a damaging earthquake; worried about the possibility of a coming earthquake; belief that an earthquake will occur soon, and a change in earthquake concern during the past year).

Table 2. Coding Scheme for the Independent and Intervening Variables Included in the Models Predicting Rumoring and Belief in Rumor

Variables	Coding Scheme
Independent Variables:	
Age	18-89
Sex	0=Male 1=Female
Ethnicity	0=Nonwhite 1=White
Education	0-20 years completed
Income	1=Under $10,000 2=GT $10,000/LT $15,000 3=GT $15,000/LT $25,000 4=Over $25,000
Number of Children	0-7
Years in Community	0-78 years
Respondent's Real Community (REAL COMMUNITY)	0=Happen to be here at time of earthquake 1=Real home
Move Within Five Years	1=Definitely 2=Probably 3=Probably not 4=Definitely not
Number of Earthquakes Experienced (EXPERIENCE)	0-3
Intervening Variables:	
Had Idea Earthquake Was Going to Happen (IDEA EARTHQUAKE HAPPEN)	0=No 1=Yes
Earthquake Likely Within Year (EARTHQUAKE LIKELY)	1=Definitely 2=Probably 3=Probably not 4=Definitely not

Table 2. (cont.)

Variables	Coding Scheme
Number of Non-scientific Signs That Can Be Used to Predict Earthquakes (NON-SCIENTIFIC SIGNS)	0-5
How Accurate Scientists Predict (PREDICTION ACCURACY)	1=Quite accurately 2=Somewhat accurately 3=Not too accurately 4=Not at all
Bulge Awareness	1=Not heard 2=Aware/no belief 3=Aware/believe
Concern in Past Year About Possible Earthquake (CONCERN)	1=Increased 2=About the same 3=Decreased
Worried About Possible Earthquake (WORRY)	1=Very worried 2=Somewhat worried 3=Hardly worried 4=Not at all worried
Fear of Damaging Earthquake (FEAR)	1=Very frightened 2=Somewhat frightened 3=Not very frightened 4=Not at all frightened
Made Informal Contact After Earthquake (INFORMAL)	0=No 1=Yes
Made Formal Contact After Earthquake (FORMAL)	0=No 1=Yes
<u>Dependent Variables:</u>	
Number of Rumors Heard	0-4
Rumor Belief Ratio	Ratio between 0 and 1 with 0 equal to no belief and 1 equal to total belief
Rumor That Earthquake is Sign of Larger Earthquake to Come Soon	1=It is true 2=It may be true 3=It is false

Analyses were conducted on three dependent variables--number of rumors heard; ratio of rumors believed; and belief that the New Year's Day quake is a sign that a larger earthquake is coming.

Two of the three independent variables--number of rumors heard and rumor belief ratio--were coded as continuous variables. Number of rumors heard had a range of 0 to 4. This analysis includes all respondents who knew that the New Year's Day quake occurred.

The rumor belief ratio could vary between 0 and 1 and is an indication of one's overall belief in the rumors one heard. It was computed by taking the number of rumors that a respondent did not believe or hedged on, subtracting that figure from the number of rumors heard, and dividing by the number of rumors heard. Thus, if a respondent heard four rumors and believed each one, he/she would have a belief ratio score of 1. If, on the other hand, a respondent heard 2 rumors and believed neither one, he/she would have a belief ratio score of 0. Only respondents who had heard one or more rumors were included in these analyses.

The final dependent variable, belief in the rumor that the New Year's Day earthquake was a sign of a larger earthquake to follow, included only those respondents who had heard this rumor.

The assumption was made that the relationship between the independent, intervening and dependent variables was linear. Thus, to evaluate the influence of the independent and intervening variables on the three dependent variables, multiple regression was chosen as the mode of analysis. Tables 3 through 5 provide information on the impacts of the independent and intervening

Analyses were conducted on three dependent variables--number of rumors heard; ratio of rumors believed; and belief that the New Year's Day quake is a sign that a larger earthquake is coming.

Two of the three independent variables--number of rumors heard and rumor belief ratio--were coded as continuous variables. Number of rumors heard had a range of 0 to 4. This analysis includes all respondents who knew that the New Year's Day quake occurred.

The rumor belief ratio could vary between 0 and 1 and is an indication of one's overall belief in the rumors one heard. It was computed by taking the number of rumors that a respondent did not believe or hedged on, subtracting that figure from the number of rumors heard, and dividing by the number of rumors heard. Thus, if a respondent heard four rumors and believed each one, he/she would have a belief ratio score of 1. If, on the other hand, a respondent heard 2 rumors and believed neither one, he/she would have a belief ratio score of 0. Only respondents who had heard one or more rumors were included in these analyses.

The final dependent variable, belief in the rumor that the New Year's Day earthquake was a sign of a larger earthquake to follow, included only those respondents who had heard this rumor.

The assumption was made that the relationship between the independent, intervening and dependent variables was linear. Thus, to evaluate the influence of the independent and intervening variables on the three dependent variables, multiple regression was chosen as the mode of analysis. Tables 3 through 5 provide information on the impacts of the independent and intervening

variables on the dependent variables. Although the assumption of linearity would seem to be problematic in the case of the third dependent variable--belief that the earthquake was a sign of a larger one to follow--ordinary least squares (OLS) regression is considered a "robust" technique (Lewis-Beck, 1980). That is, OLS parameter estimates are not meaningfully influenced by violations of the underlying regression assumptions (such as the assumption of linearity). Thus, for ease of analysis, multiple regression was chosen as the method of analysis for all three models.

Table 3 presents the coefficients for the independent and intervening variables on the number of rumors heard. In looking at the coefficients, only one variable, whether one affectively considered that his/her current community was a "real home" not just a place one happened to be living in at the time of the earthquake, had a significant impact on the number of rumors heard. The positive, standardized coefficient (.2178) for this dummy variable indicates that those respondents who affectively identified themselves with their current community heard more rumors than respondents who were not affectively attached to their communities. This variable had the greatest impact on the number of rumors heard.

The 20 variables taken together explain 17 percent (R^2=.1681) of the variance in rumors heard. The model as a whole was a significant predictor of the number of rumors heard as indicated by the F-value of 2.415, significant at the .001 alpha level. Regardless of the model significance, however, only the single

Table 3. Regression Coefficients and Standard Errors for Independent and Intervening Variables on Number of Rumors Heard

Variables	Standard Errors	Unstandardized Coefficients	Standardized Coefficients
Independent Variables:			
AGE	.0032	-.0028	-.0588
SEX	.0967	-.1231	-.0833
ETHNICITY	.1108	-.0034	-.0021
EDUCATION	.0165	.0070	.0287
INCOME	.0454	-.0881	-.1322
NUMBER OF CHILDREN	.0395	-.0290	-.0474
YEARS IN COMMUNITY	.0048	-.0079	-.1164
REAL COMMUNITY	.1088	.3308	.2178**
MOVE WITHIN FIVE YEARS	.0489	-.0957	-.1333
EARTHQUAKE EXPERIENCE	.0562	-.0275	-.0323
Intervening Variables:			
IDEA EARTHQUAKE HAPPEN	.1526	.0364	.0146
EARTHQUAKE LIKELY	.0739	.1427	.1237
NON-SCIENTIFIC SIGNS	.0500	.0934	.1158
PREDICTION ACCURACY	.0539	.0542	.0618
BULGE AWARENESS	.0540	-.0217	-.0254
CONCERN	.0961	-.1399	-.0957
WORRY	.0599	-.0953	-.1236
FEAR	.0542	-.0701	-.0969
INFORMAL CONTACT	.1437	.1736	.0742
FORMAL CONTACT	.0948	.0622	.0422

R^2=.1681 F-value=2.415*** *p<.05 **p<.01 ***p<.001

community attachment variable was a significant predictor of the number of rumors heard. Also, the model's explanatory power is minimal as shown by a small R^2. Further, much of the minimal variance explained in rumors heard by the model can be attributed to the single community attachment variable. In conclusion, this model is far from being a parsimonious predictor of the number of rumors heard.

Table 4 presents the regression coefficients for the independent and intervening variables on the rumor belief ratio. In looking at the standardized coefficients, ethnicity, the number of children in the household, belief that a damaging earthquake is likely, and whether the respondent made any informal contacts following the New Year's Day earthquake all had significant impacts on the extent of one's belief in the rumors heard. The positive standardized coefficient of .2079 for ethnicity, a dummy variable, indicates that White's tended to have higher belief ratio scores than non-Whites. Thus, Whites tended to believe more of the rumors they heard than did non-Whites.

The significant, positive coefficient for number of children in the household (.3168, <.001) indicates that as the number of children increases so does rumor belief. Hence, respondents who came from households with more children tended to believe more of the rumors he/she heard than did respondents from households with fewer or no children.

Table 4. Regression Coefficients and Standard Errors for Independent and Intervening Variables on Rumor Belief Ratio

Variables	Standard Errors	Unstandardized Coefficients	Standardized Coefficients
Independent Variables:			
AGE	.0027	.0031	.1096
SEX	.0764	-.0030	-.0283
ETHNICITY	.0855	.1794	.2079*
EDUCATION	.0123	.0082	.0639
INCOME	.0354	-.0247	-.0684
NUMBER OF CHILDREN	.0310	.1109	.3168***
YEARS IN COMMUNITY	.0038	-.0015	-.0416
REAL COMMUNITY	.0924	-.1491	-.1748
MOVE WITHIN FIVE YEARS	.0405	.0591	.1488
EARTHQUAKE EXPERIENCE	.0424	-.0057	-.0127
Intervening Variables:			
IDEA EARTHQUAKE HAPPEN	.1211	.1467	.1053
EARTHQUAKE LIKELY	.0547	-.1576	-.2694**
NON-SCIENTIFIC SIGNS	.0367	.0211	.0502
PREDICTION ACCURACY	.0410	-.0048	-.0101
BULGE AWARENESS	.0440	.0637	.1305
CONCERN	.0715	-.0415	-.0579
WORRY	.0492	-.0294	-.0688
FEAR	.0452	.0439	.1036
INFORMAL CONTACT	.0100	-.2135	-.1871*
FORMAL CONTACT	.0745	.1474	.1822

R^2=.2853 F-value=2.155** *p<.05 **p<.01 ***p<.001

The significant, negative coefficient (-.2694, <.01) indicates an inverse relationship between the likelihood of an earthquake occurring within one year and the respondents' belief ratio scores. Thus, respondents who indicated that an earthquake was more or less unlikely within a year tended to have less belief in the rumors they heard than respondents who indicated that an earthquake was likely within a year.

Finally, respondents who indicated they had some informal contacts after the New Year's Day earthquake, i.e., they contacted friends or family, tended to believe less rumors than those who made no informal contacts. The negative coefficient of -.1871 was significant at the .05 alpha level.

In looking at the standardized coefficients for these four variables, number of children living in the household had the largest impact followed by a belief in the likelihood of an earthquake in the next year, ethnicity, and informal contact.

Taken as a whole, the variables in the model explain 29 percent (R^2=.2853) of the variance in the rumor belief ratio, or rumors believed. The model as a whole was a significant predictor of the belief ratio as indicated by the F-value of 2.155, significant at the .01 alpha level. Although the variables taken together had more explanatory power in terms of belief in the rumors heard, rather than the number of rumors heard, the model is not a parsimonious predictor of respondents belief ratios.

Table 5. Regression Coefficients and Standard Errors for Independent and Intervening Variables on Belief That Earthquake is Sign of Larger One to Come Soon

Variables	Standard Errors	Unstandardized Coefficients	Standardized Coefficients
Independent Variables:			
AGE	.0046	.0010	.0225
SEX	.1266	.0261	.0206
ETHNICITY	.1378	-.2031	-.1538
EDUCATION	.0194	-.0198	-.1027
INCOME	.0576	.0897	.1578
NUMBER OF CHILDREN	.0514	-.1562	-.2858**
YEARS IN COMMUNITY	.0066	-.0023	-.0385
REAL COMMUNITY	.1518	.2336	.1747
MOVE WITHIN FIVE YEARS	.0658	-.0694	-.1106
EARTHQUAKE EXPERIENCE	.0699	.0235	.0344
Intervening Variables:			
IDEA EARTHQUAKE HAPPEN	.1954	-.3104	-.1474
EARTHQUAKE LIKELY	.0872	.2727	.3065**
NON-SCIENTIFIC SIGNS	.0594	-.0242	-.0372
PREDICTION ACCURACY	.0686	.0419	.0559
BULGE AWARENESS	.0734	-.0436	-.0563
CONCERN	.1169	.2249	.2061
WORRY	.0795	.0532	.0809
FEAR	.0737	-.0435	-.0667
INFORMAL CONTACT	.1677	.3105	.1777
FORMAL CONTACT	.1246	-.1234	-.0977

R^2=.3444 F-value=2.358** *p<.05 **p<.01 ***p<.001

In the final model, only two variables had a significant impact on belief in the rumor that the New Year's Day earthquake was a sign of a larger earthquake to follow. As shown in Table 5, number of children in the household had an inverse relationship with belief in the rumor (-.2858, <.01), indicating that households with more children were more likely to believe the rumor than households with fewer children. This is consistent with the finding for the second model looking at belief in general across the four rumors.

Also consistent with the second model is the significant impact of likelihood of an earthquake within the year on the dependent variable. As expected, those respondents who indicated that an earthquake was not likely to occur within the next year did not, for the most part, believe the rumor that the New Year's Day earthquake was a sign of a larger earthquake to follow. The positive coefficient of .3065 was significant at the .01 alpha level. Of the two significant variables, likelihood of an earthquake within one year had the greatest impact on belief in the rumor.

The 20 independent and intervening variables had the greatest explanatory power in this model as indicated by the R^2 of .3444. Hence, the 20 variables together explained 34 percent of the variance in belief in the rumor that the New Year's Day earthquake was a sign of larger earthquake to follow. The model was a significant predictor of belief in this rumor as indicated by an F-value of 2.358, significant at the .01 alpha level. However, since

only two of the 20 variables were significant, this model cannot be considered a parsimonious predictor of belief in the rumor.

Conclusions

In sum, the three models had little success in explaining who was a rumorer and who was a rumor believer. Indeed, only five of the 20 independent and intervening variables had significant impacts on the three dependent variables under analysis.

In the first model addressing who heard rumors, only the community attachment variable "real home" distinguished rumorers from non-rumorers. Those respondents who considered his/her current community as a "real home" heard significantly more rumors than those respondents who considered his/her community just a place they happened to be living in at the time of the earthquake. Hence, the more attached one is to their community, the more likely they are to hear rumors. Community attachment may lead to greater group involvement and increase the communication networks available to an individual, thus increasing the odds of hearing a rumor.

Four variables distinguished believers from disbelievers: ethnicity, the number of children in the household, belief that a damaging earthquake is likely, and whether the respondent made any informal contacts following the New Year's Day earthquake. Respondents with large families, White's, those who believed that a damaging earthquake was likely within a year, and those respondents who indicated they had some informal contacts after the New Year's Day earthquake all tended to believe more of the rumors

they heard. Of these four variables, the number of children in the household and belief that a damaging earthquake is likely within a year were consistent predictors of belief for both of the belief models.

Similar to community attachment, large families will have more children in school and therefore may have wider communication networks. This may increase the odds of hearing more rumors. The more rumors that are heard may lead to more rumors believed.

Finally, it seems obvious that respondents who believed that a damaging earthquake was likely were also more likely to believe the rumors they heard, especially the rumor that the New Year's Day earthquake was a sign of a larger earthquake to occur soon. Indeed, this rumor was congruent with these respondent's beliefs of the likelihood of a future damaging earthquake.

Although these findings are tentative, ethnicity, number of children in the household, community attachment, and communication indicators (informal contacts) should be further explored to understand their impacts on rumoring and belief in rumors. However, future analyses may benefit by moving away from quantitative approaches and returning to more naturalistic analyses of processes of rumoring and the factors that distinguish rumorers and believers.

BIBLIOGRAPHY

Allport, G. and L. Postman. 1947. *The Psychology of Rumor*. New York: Holt, Rineholt, and Winston.

Edwards, M. 1991. *Public Response to Earthquake Prediction*. Master's Thesis. Newark, DE: University of Delaware.

Lang, K. and G. Lang. 1961. *Collective Dynamics*. New York: Thomas Y. Crowell Company.

Lewis-Beck, M.S. 1980. *Applied Regression: An Introduction*. Newbury Park, CA: Sage Publications.

Lindh. 1991.

Shibutani, T. 1966. *Improvised News: A Sociological Study of Rumor*. Indianapolis: Bobbs-Merrill.

Smelser, N. 1962. *Theory of Collective Behavior*. New York: Free Press.

Tierney, K. n.d. *Making Sense of Collective Preoccupations: Lessons From Research on the Iben Browning Earthquake Prediction*. Newark, DE: Disaster Research Center, University of Delaware.

Turner, R.H. and L.M. Killian. 1957. *Collective Behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Turner, R.H., J.M. Nigg, and D.H. Paz. 1986. *Waiting for Disaster: Earthquake Watch in California*. Berkeley, CA: University of California Press.