Earthquake hoax in Ghana: exploration of the *Cry Wolf* hypothesis

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Abstract

This paper investigated the belief of the news of impending earthquake from any source in the context of the *Cry Wolf* hypothesis as well as the belief of the news of any other imminent disaster from any source. We were also interested in the correlation between preparedness, risk perception and antecedents. This explorative study consisted of interviews, literature and Internet reviews. Sampling was of a simple random nature. Stratification was carried out by sex and residence type. The sample size of (N=400), consisted of 195 males and 205 Females. Further stratification was based on residential classification used by the municipalities. The study revealed that a person would believe news of an impending earthquake from any source, (64.4%) and a model significance of (P=0.000). It also showed that a person would believe news of any other impending disaster from any source, (73.1%) and a significance of (P=0.003). There is association between background, risk perception and preparedness. Emergency preparedness is weak. Earthquake awareness needs to be re-enforced. There is a critical need for public education of earthquake preparedness. The authors recommend developing emergency response program for earthquakes, standard operating procedures for a national risk communication through all media including instant bulk messaging.

Introduction

Irrational fear has the same deleterious effects on the human body as heart attack, stroke and depression.[1] When rumors of an earthquake hit Ghana late Sunday night, 17th January, 2010 at about 3:00 am GMT, it prompted millions of residents of diverse demographics, and in both urban and rural communities onto the streets. The aftermath of the Haitian quake seen on national and international television stations, pre-occupied the minds of many as they fled their houses, apartments and tenements.[2] A text message is reported to have initiated the hoax. The message had predicted that an earthquake was about to hit the country and advised people to stay out of their rooms to avoid being killed by collapsing buildings. The message quoted the National Aeronautical Space Agency, (NASA) and the British Broadcasting Corporation, (BBC) as sources.[2] Although in the immediate aftermath of this event, the authorities took action to reassure the public and to provide them with counter information that there had been no earthquake in Ghana at that time, there was no follow-up on the perceptions and attitudes of the residents towards subsequent risk information on emergency or health promotion. This study investigated if a person would believe news of an impending earthquake from any source in the context of the *Cry Wolf* hypothesis. Additionally, we evaluated if a person would believe news of any other impending disaster from any source in order to assess the public's reaction to subsequent risk communication. This would inform policy on risk reduction, intervention and risk communication.

Set against what appears, as irrational fear of earthquakes in Ghana is the fact that Ghana sits on earthquake fault line. Ghana has not experienced an earthquake in the last 60 years though tremors are periodically rattling the residents along the coastal belt. Historically, Accra and the nearby coastal areas have experienced four seriously damaging earthquakes on Richter magnitude of about 6 during the last 400 years. The significant ones were in 1858, 1863, 1883, 1907, 1911, 1918, 1923, 1925, 1930, and 1933-35. The major ones were 1635, 1862, 1906 and 1939. The most destructive earthquake that struck the then Gold Coast, (Ghana) and caused a lot of damage, loss of life and property, was on the 2nd June 1939.[3,4] In 1939, seventeen people were killed and one hundred and thirty three injured. Its magnitude was 6.5 on the Richter scale. In more recent times, earthquakes and strong tremors some with magnitude of 4.9 on the Richter scale have been experienced in 1964, 1969, 1979, 1985, 1995, and 1997.[4] However, Ghana's exposure to earthquake is modest considering that the peak ground acceleration is only likely to be exceeded with a 10% chance in 50 year time in terms of seismic activity on the probabilistic seismic hazard map of Africa and the Middle East.[5] Despite the apparent assurance, it is generally believed among the residents that the country is long overdue for a big earthquake. This snapshot of earthquakes in Ghana provides the backdrop for the reaction of the residents to the earthquake hoax.

Ghana has not had a mass casualty event since the 1994 Stadium disaster where 124 persons died. Social capitals are better spent on plausible threats than on the imagined.[1] The panic experienced by the population on the day of the hoax could be attributable to the lack of a national risk communication mechanism. In crisis risk communication, the lack of trust and credibility for the communicator can devalue the importance of the message and increase the residents' exposure to the threat.[6-10] It is important to note that previous researchers have also shown that public reliance on official warnings is shifting from traditional sources to more private and informal sources. The use of instant bulk messaging as a means of communication is one of such new sources of information to the public.

This is particularly so in low-income countries, where access to the World Wide Web is difficult for the most vulnerable. Those in the vulnerable group, women and children, those in the semi-urban areas, small farming communities and villages do not enjoy constant radio and television re-diffusion services, due to frequent power outages and breaks in transmission.[8-9,11] Atwood and Major, (1998) noted that individuals who have experienced predictions of disaster that did not materialize will discount the validity of a subsequent emergency warning. They also concluded that the media are substantial contributors to the

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observed false alarm effect. Much of the literature discussed the reaction of populations in the industrialized nations.[1,9-14]

Quarantelli however argued that individuals do not panic in disasters. He further sustained the position that if they do, the effect is not long lasting. That position was not supported by other researchers such as Green and Lindsay, and Miller.[15-17] Many other researchers had not only disagreed with the position of the former, but agreed with the latter that, indeed, individuals do panic in emergencies. In addition, they also suffer post traumatic stress disorder and other deleterious health outcomes.[1,16,17] It was also contended that in certain cases people do learn from false alarm and are not less willing to respond to the next warning although, for example, in the Boulder, Colorado wildfires of 2002, it was found that previous false alarm did influence a considerable number of the residents in responding to subsequent alarms.[18,19] This study investigated if any of the reactions observed in the populations of the industrialized nations with regards to the *cry wolf hypothesis* are consistent with those in the developing nations, using the earthquake hoax in Ghana as a case study in order to inform policy on earthquake emergency preparedness and risk communication.

Materials and Methods

The method used for this baseline, explorative study consisted of questionnaire survey and internet review. The literature review was done searching relevant books and journals and from websites using keywords like *cry wolf hypothesis, risk communication and source credibility, earthquake hoax and emergency preparedness*. The national Disaster and Emergency preparedness plan of 1997 and other related national documents were analyzed to determine how those have collectively prepared the communities with basic earthquake survival skills. Evaluation of the legal framework on disaster risk reduction and risk management was undertaken to assess the mandate for intervention given to the main coordinating agency for disasters and emergencies with particular emphasis on Act 517 of 1996. Act 517 established the National Disaster Management Organization. Discussion of the national preparedness plan and the legal framework were based on the authors' understanding of disaster and emergency preparedness particularly for earthquake and international best practice.

Field research

Study population and sample size estimation

The study was conducted in the West African nation of Ghana in 2011. There are ten (10) administrative regions in Ghana, which are divided into a total of 138 metropolitan, municipal and district assemblies. The study was carried out in the Greater Accra Region with Accra as its capital (this is also the largest city and capital of Ghana). The Greater Accra Region has two (2) metropolitan areas, six (6) municipal areas and two (2) district assemblies. However the two (2) metropolitan areas and three (3) of the municipalities were considered in the sample selection due to their close proximity, high population densities and also because communities found in these areas represent both the indigenes and also the large number of migrants and settlers from the entire country. Sample selection was random but the sampling frame may be considered convenient as the impact of the hoax seemed hardest within the Accra-Tema metropolis. The communities are classified in Table 1.

Table 1. Classification of sampled in Accra Metropolitan Authority and Tema Metropolitan Authority.

1st Class Accra	2nd Class Accra		3rd Class Accra	4th Class Accra	Tema area
Abelemkpe	Abelemkpe	Nii Boi Town	Aborfu	Abossey Okai	Ashaiman
Airport Residential Area	Accra New Town	North Kaneshie	Alajo	Asere	Bethelehem
Asylum Down	Achimota	North Labone	Avenor Area	Bukom	Kpone
Burma Camp	Agbogbloshie	Nungua	Bubuashie	Chorkor	Lashibi
Dansoman	Akokorfoto	Odawna	Chemuna	Nungua Old Town	Sakumono
Dzorwulu	Akweteman	Odorkor	Dansoman Amanhoma	Teshie Old Town	Tema Community 1
East Cantonments	Alajo	Okaishie	Darkuman	Ussher Town	Tema Community 2
East Legon	Apenkwa	Old Dansoman	Gbegbeyise	Zongo	Tema Community 3
East Ridge	Asylum Down	Osu	Korle Gonno		Tema Community 4
Independence Avenue	Avenor	Osu Ako-Adjei Estates	Kotobabi		Tema Community 5
Kanda Estates	Chorkor	Sahara	Mamobi		Tema Community 6
Kuku Hill	Dansoman	Sakaman	Mampose		Tema Community 7
North Dzorwulu	Darkuman	Sempe New Town	New Fadama		Tema Community 8
North Labone	East Legon	South Amanhoma	New Mamprobi		Tema Community 9
Nungua East	East Legon (Okponglo)	South Kaneshie	Nima		Tema Community 11
Police Headquarters Area	Kokomlemle	South Labadi	North Labone		Tema Community 18
Ridge	Kotobabi	South Odorkor	Nungua-Zongo		Tema Community 19
Ringway Estates	Kwashieman	Tesano	Odorkor		Tema Community 20
Roman Ridge	Labadi-Aborm	Teshie New Town	Osu Ako-Adjei		Tema Newtown
South Shiashie	Lartebiokorshie	W/Okponglo	Osu Alata/Ashante		
T/Junction	Link Road		Shiabu		
Tesano	Mantseman		South Shiashie		
Teshie-Nungua Estates	Mataheko		Sukura		
Zoti Area	New Abossey Okai		Zabramaline		

AMA, Accra Metropolitan Authority; TMA, Tema Metropolitan Authority. NB: Some locations fall under multiple classes due to their large size and differences between them. First Class properties attract the highest rates, Second Class attracts higher rates, Third Class attracts high rates and Fourth Class attracts low rates. Tema township property rates are determined by flat community rates since the township is subdivided into communities and not by suburbs.

Sampling was of a simple random nature. Stratification was carried out by gender and by residence type according to the various classifications provided by the Accra Metropolitan Authority (AMA) and Tema Metropolitan Authority (TMA), *i.e.* First class, Second class, Third class and Fourth class residential. Tema uses numbers to label respective suburbs such as Community One, Community Two. The sampling units were selected equally from sampling locations according to the various classifications provided by the Accra Metropolitan Authority (AMA) and Tema Metropolitan Authority (TMA) regarding the location and residential types, *i.e.* First class, Second class residential. To estimate sample size in such a situation the formula is:

$$n = \left[\frac{(Z_{1-\alpha/2})^2 p(1-p)}{d^2}\right]$$

where $z_{1-\alpha/2}$=1.96, is a critical point on the standard normal distribution using α=0.05 as the significance level and 1-α as the confidence level, assuming a normally distributed population. p is the expected proportion of the main attribute of interest in our sample (for example, the proportion of the people that run out of their houses, apartments, flats and tenements, etc) and d is the acceptable margin of error of estimating within the true population proportion. Using the highest combination of p and 1-p and d=0.05 gives the following:

$$n = \left[\frac{(1.96)^2(0.5X0.5)}{(0.5)^2}\right] = 384.14$$

which is rounded of f to 400.

Therefore, the sample size was 400.

Sampling procedure: sex distribution and proportionate sampling

The 2010 Ghana census puts the proportion of males at 48.72% and females at 51.28%. Using this as a guide, out of the sample size of 400, we selected 195 males and 205 females. These were selected equally by proportion and randomly from each of the four (4) classes of locations according to the AMA/TMA classification system. In each residential area, we did the selection of samples from the center of that area and sampled every 5th house until we obtained the required allocation for that area. Sampling from Tema was purely random based on similarities with the distribution within Accra. The total from each residential class was 100. The number of females from each class was 51.28% but rounded up to 52%. The overall total of respondents sampled was 404 due to rounding off, Table 1.

Data processing and analysis

Data analyses were carried out to find the demographic characteristics of the respondents. These were done using the Statistical Package for Social Sciences (SPSS), and also STATA where there were low cell counts. Logistic analysis was carried out to investigate if the following predictor variables: level of concern when residents heard the alarm, the effect on sleep and the help received from disaster/security officials during the alarm can be used to predict: i. if a person would believe news of an impending earthquake from any source; ii. if a person would believe news of any other impending disaster from any source.

Interpretation of the logistic tables

Overall Percentage: This gives the percent of cases for which the outcome variable is correctly predicted, given the model. Model Significance: The P is compared to the critical value (.05) to determine if the overall model is statistically significant. B: These are the values for the logistic regression equation for predicting the outcome variable from the predictor variables. They are in log-odds units and are more useful when exponentiated [Exp (B)]. S.E.: These are the standard errors associated with the coefficients (the higher this is, the less reliable the corresponding variable is to the model). Sig.: This is the significance of each variable within the overall model. Exp (B): These are exponentiation of the coefficients (B) and are also the odds ratios for the predictors, which can be used to predict the odds that a person would believe an impending disaster, given a unit increase in the predictive variable. *E.g.* from the first table below, a value of Exp (B)=1.190 means that a respondent is 1.190 times more likely to believe in an impending disaster from any source given a unit increase in the variable *Level of concern when they heard the alarm*, holding all other responses in the model constant. This is a significant predictor (p-value=0.029) for that model. This seems a bit strange for the variable *Help received from officials*. Does this mean the respondents are more likely to believe false earthquakes no matter what *help* they receive from officials? For all other situations without the predictor variables, the odds of believing are equal to the value of the constant under the Exp (B) column.

Systematic Internet

Systematic review

A systematic review of the legal framework on disaster and emergency management was undertaken to assess provisions made for public education on earthquakes, disaster risk reduction, and mitigation modalities. The National Disaster and Emergency Preparedness Master Plan of 1997 and other related documents were analyzed to determine how they have prepared the communities with basic earthquake survival skills, such as location and awareness of safe havens, and organizing rescue and search missions as well as maintaining basic food and water supplies for emergencies.[10,19]

A systematic Internet search was also conducted using carefully designed keywords such as *cry wolf hypothesis, earthquakes, Ghana, or Ghana, earthquake, emergency preparedness*. The results from the national search and legislative framework were compared with international best practices.

Results

Basic demographics

There were 398/400 valid returns from respondents. The mean age was 29.38. The median age was 26 with the minimum being 17 and the maximum age being 85, (Std. deviation=10.58). Of the (n=398) figure, 50.8% were female. The majority of the respondents were single registering (66.16%), but those married were (30.05%). The rest were cohabiting (1.26%), divorced (0.76%), widowed (0.76%) or separated (1.01%). Those who were less than 20 years were [71/384 (18.5%)], between 21 and 29 were [179/384 (46.4%)] and those between 30 and 39 were [79/384 (20.6%)]. A total of 56/384 (15%)] were 40 years and over. The females were [202/398 (50.8%)] whiles the males were [196/398 (49.2%)]. Notice that the denominators changed due to missing values for some questions/variables. Also, it wouldn't make sense to use the one denominator in calculating all proportions for all the responses. Only the valid responses were used per question.

Relationship between age and reaction to the hoax

The relationship between age and the belief in the earthquake hoax was more demonstrated in the under 21-year-old group. In Table 2 it is noted that within the under 21-year-old group, more females claimed they initially believed the hoax [27/41 (65.9%)] than the male respondents [11/22 (50.0%)]. Overall, more females believed the hoax [107/170 (62.9%)] than males [73/168 (43.5%)]. Also, belief in the false alarm was significantly dependent on age within females (P=0.020) but not so within males (P=0.124). Table 2 is a cross-tabulation between ages of the respon-

dents and whether they initially believed the hoax using sex as a blocking variable. Of the 398 respondents who had their sex reported, total valid responses for both age and whether they initially believed the hoax were 338 (females=170, males=168) so obviously a cross-tabulation would exclude those missing values (398-338=60).

The relationship between religion and the reaction to the hoax

Among the females that reported being Christians, [103/166 (62%)] initially believed in the hoax. This was not significant. Christianity is the predominant religion in Ghana. Compared to the males, [63/156 (44.2%)] believed in the hoax, with a significance of (P=0.066).

The relationship between education and the reaction to the hoax

The study found that among females, the majority of the respondents with or without some form of formal education believed in the earthquake hoax recording [109/172 (63.4%)] as affirmative with a significance of (P=0.001). Among the males, the majority did not believe in the hoax [93/173 (56.6%)] and a significance of (P=0.000). The ratio of female to male respondents was 1:1 or [172/345] females and [173/345] males. However, there was an even split between those with secondary education among the males who believed and those who didn't believe in the hoax.

The relationship between employment and reaction to hoax

Employment status seems to be a determining factor in believing in the earthquake hoax. Those who were employed [63/106(59.5%)] among the females, demonstrated a high degree of believability in the hoax, compared to those who were not employed, were students or retired [43/106 (40.5%)]. Although in percentage terms majority of the female respondents with employment believed in the hoax, this was not statistically significant. The same outcome is noted in the case of the male participants that reported being employed.

The relationship between income and reaction to the hoax

It appears those who were unemployed and therefore had no incomes were more naturally less optimistic and therefore more fearful of earthquakes. Among the females, those without income showed a higher level of believability in the hoax [44/92/149 (61.1%)] than those females who had incomes. It appears the greater the level of income, the less believability accorded to the hoax. The significance for females in terms of the association between income and believability in the hoax was high, (P=0.026). Similar outcome was noticed among the males who had no income translated thus [28/62/151 (42.4%)] with a significance of (P=0.057). All in all, more males without income did not believe in the hoax than women similarly situated.

Summary of analysis of the relationships between variables

The following is a summary of investigation to determine if the row and column variables are dependent on each other, using Pearson chi-square and Fisher's exact tests (where there are low cell counts) at 5% significance level. This is with respect to knowledge of what earthquakes and tremor are, and if their knowledge is dependent on their background. Additionally we determined if their knowledge of the right precautionary measures to take in an earthquake and what safe havens are, are background-dependent, Table 3.

The summary contained in Table 4 covers assessment of prior earthquake experience and knowledge of earthquake/tremors. Both males and females seemed to have appreciable knowledge of earthquakes with [161/318 (50.6%0] males and [157/318 (49.4%0] females correctly identifying what causes earthquakes.

Logistic analysis

The following show results from logistic analysis carried out to investigate if the following predictor variables: level of concern when they heard the alarm, effect on sleep and help received from disaster/security officials during the alarm can be used to predict: i. if a person would believe news of an impending earthquake from any source; ii. if a person would believe news of any other impending disaster from any source.

Dependent variable: if a person would believe news of an impending earthquake from any source

Predictors: Level of concern when they heard the alarm, effect of alarm on sleep and help received from disaster/security officials during the alarm. Overall Percentage=64.4. Model Significance=0.000 (Table 5).

Dependent variable: If a person would believe news of any other impending disaster from any source

Predictors: Level of concern when they heard the alarm, effect of alarm on sleep and help received from disaster/security officials during the alarm. Overall Percentage=73.1. Model Significance=0.003 (Table 6).

Discussion

The result from this study has shown that there is disconnect between general disaster preparedness and the risks facing the nation, particularly earthquakes. The Ghana National Emergency Master plan of 1997, reviewed and adopted in May 2010, had no provision for safe havens. With the exception of a handful of soccer fields and stadia, there are no other public parks where the population can assemble in times of emergencies except in the streets. There are also no modalities for early warning or crises risk communication in emergencies to inform the residents of an imminent threat.[10,19] Such a vacuous situation allows for manipulation of events by the more passionate elements of society such as the media. Ghana nation has not developed an earthquake survival plan or conducted public education on earthquake awareness within the last 50 years.

Table 2. Relationship between age and reaction to the hoax using sex as a blocking variable.

Sex	Age categories (years)	Initially believed the hoax Yes	No	Total	P
Female	Less than 20	27 (65.9%)	14 (34.1%)	41 (100.0%)	0.020
	21-29	43 (57.3%)	32 (42.7%)	75 (100.0%)	
	30-39	26 (78.8%)	7 (21.2%)	33 (100.0%)	
	40-49	5 (33.3%)	10 (66.7%)	15 (100.0%)	
	Over 50	6 (100.0%)	0 (0.0%)	6 (100.0%)	
	Total	*107 (62.9%)*	*63 (37.1%)*	*170 (100.0%)*	
Male	Less than 20	11 (50.0%)	11 (50.0%)	22 (100.0%)	0.124
	21-29	33 (37.1%)	56 (62.9%)	89 (100.0%)	
	30-39	14 (40.0%)	21 (60.0%)	35 (100.0%)	
	40-49	12 (66.7%)	6 (33.3%)	18 (100.0%)	
	Over 50	3 (66.7%)	1 (33.3%)	3 (100.0%)	
	Total	*73 (43.5%)*	*95 (56.5%)*	*168 (100.0%)*	

This is despite the fact that Ghana sits on earthquake fault line. The history and fear of earthquakes in Ghana provides the justification as to why the quake hoax was successful. There is a great disparity of knowledge about the inability of seismology to predict earthquakes between the more and the less educated.[20-22] Such knowledge would have sensitized the public to the fact that an earthquake happening in a few moments from now was not predictable.[23]

Glik (2007) has documented three factors found to influence warning response. These are: sender and receiver factors, situational factors and finally social contact. In this situation, though the sender was anonymous, he/she quoted NASA and BBC, two institutions, which the residents trust, and respect, as sources. *Source credibility* was one of the factors that seemed to have influenced the reaction of the residents, though wrongly.[7,23-24] Ghana is confronted with short- to medium-term natural and health emergencies that put the residents on edge.[5,19,25,26] This fact challenged the contention by Yamamura that repeated exposure to the same stimuli by social capital builds resiliency and familiarity. Ghana is susceptible to seasonal flooding and landslides during the rainy season as well as other public health emergencies, micro- and macro-economic, and socio-political crises.[19,25] Despite the frequent exposure to the state of permanent crisis, the reaction of the residents did not support the conclusion that they had developed *Teflon* protection against emergencies of any kind. Their reaction in the earthquake false alarm rather seems to support the position of Perry and Lindell *et al.*, that, false alarm helps the learning process in emergency preparedness.[26] To take the reasoning of Perry and Lindell to its logical conclusion in the case of Ghana that because the residents are constantly exposed to emergencies of all kinds, they should, therefore, be better prepared to handle them would be absurd. The low-income nations bear a high percentage of damages and fatalities in disasters and emergencies compared to their counterparts in the developed economies precisely because they have not mastered how to effectively prepare their economic and social capital against disasters and emergencies by learning from each other.[20,21,27-31] These nations have also not learned how to transfer the cost of managing disasters and emergencies to the insurance industry.[20,21,31]

There are no standard operating national procedures for crisis risk communication, which is made known to the residents of Ghana. Glik stated that *in crisis risk communication events, audiences have misinterpreted messages, warnings have failed to warn, false rumors have been generated, multiple sources*

Table 3. Assessment of background and knowledge of earthquakes/tremors and correct knowledge of causality.

	Know what an earthquake/tremor is n (%)	P	Know what causes it correctly n (%)	P
Age (years)		0.013		0.000
Less than 21	53/309 (17.2)		21/98 (21.4)	
21-30	133/309 (43.0)		55/98 (56.1)	
31-40	74/309 (23.9)		17/98 (17.3)	
41-50	38/309 (12.3)		4/98 (4.1)	
51-60	6/309 (1.9)		1/98 (1.0)	
61-70	3/309 (1.0)		0/98 (0.0)	
71-80	0/309 (0.0)		0/98 (0.0)	
Over 80	2/309 (0.6)		0/98 (0.0)	
Religious beliefs		0.888		0.611
Atheist	1/316 (0.3)		0/101 (0.0)	
Christian	293/316 (92.7)		92/101 (91.1)	
Muslim	19/316 (6.0)		8/101 (7.9)	
Traditional	3/316 (0.9)		1/101 (1.0)	
Highest education		0.089		0.016
None	14/313 (4.5)		1/99 (1.0)	
Primary	18/313 (5.8)		1/99 (1.0)	
Secondary	129/313 (41.2)		39/99 (39.4)	
Tertiary	146/313 (46.6)		57/99 (57.6)	
Apprenticeship	6/313 (1.9)		1/99 (1.0)	
Occupation		0.000		0.005
Unemployed	12/300 (4.0)		10/98 (10.2)	
Student	94/300 (31.3)		37/98 (37.8)	
Employed	192/300 (64.0)		51/98 (52.0)	
Retired	2/300 (0.7)		0/98 (0.0)	
Average monthly income		0.001		0.079
None	103/269 (38.3)		39/96 (40.6)	
Less than GH¢200	44/269 (16.4)		16/96 (16.7)	
GH¢200-GH¢400	61/269 (22.7)		23/96 (24.0)	
GH¢400-GH¢600	27/269 (10.0)		9/96 (9.4)	
GH¢600-GH¢800	16/269 (5.9)		5/96 (5.2)	
GH¢800-GH¢1,000	9/269 (3.3)		0/96 (0.0)	
More than GH¢1,000	9/269 (3.3)		4/96 (4.2)	

Table 4. Assessment of prior earthquake experience and knowledge of earthquakes/tremors and location.

	Initially believed false alarm n (%)	P
Know what causes earthquakes/tremors		0.380
Correct	46/113 (40.7)	
Incorrect	46/113 (40.7)	
Don't know	21/113 (18.6)	
Know at least one earthquake precautionary measure		0.501
Correct	79/104 (76.0)	
Incorrect	25/104 (24.0)	
Has ever experienced an earthquake/tremor before		0.738
Yes	101/186 (54.3)	
No	85/186 (45.7)	
Thinks current home provides protection from earthquakes/tremors		0.169
Yes	65/177 (36.7)	
No	112/177 (63.3)	
Would believe news of an impending earthquake from any source		0.000
Yes	136/182 (74.7)	
No	46/182 (25.3)	
Would believe news of any other impending disaster from any source		0.000
Yes	149/174 (85.6)	
No	25/174 (14.4)	

Table 5. If a person would believe news of an impending earthquake from any source.

	B	SE	df	Sig.	Exp(B)
Level of concern when they heard the alarm	0.174	0.080	1	0.029	1.190
Effect of alarm on subsequent sleep	0.063	0.079	1	0.422	1.065
Help received from officials	0.312	0.140	1	0.026	1.367
Constant	-0.140	0.176	1	0.427	0.869

Table 6. If a person would believe news of any other impending disaster from any source.

	B	SE	df	Sig.	Exp(B)
Level of concern when they heard the alarm	0.176	0.092	1	0.055	1.193
Effect of alarm on subsequent sleep	0.078	0.091	1	0.392	1.081
Help received from officials	0.035	0.120	1	0.769	1.036
Constant	0.464	0.186	1	0.013	1.590

have given inconsistent information, populations have not been reassured (Akoto M. 2010. Personal communications: Presentation on Earthquakes in Ghana, Ghana Broadcasting Corporation).[24,32] The media did not in the case of Ghana contribute in any significant way to the hoax and the ensuring crisis. The false alarm was initiated by a mobile phone text message sent initially from a single source, it has been alleged. The media helped to inform the residents that there had been no earthquake, thus bringing the situation under control.

Conclusions

The findings in this paper confirm that false alarm in risk communication is a major public safety issue. There is the need for public education on disasters and emergencies in general and on earthquake awareness in particular among the population.

This study hopes to encourage a longitudinal study on risk communication in relation to emergencies. The use of mobile phones for sending and receiving instant bulk text messaging in national emergencies should be developed as part of the tools for risk communication. However, there should be collaboration between services providers and the security apparatus to quickly identify those who abuse the system, raise false alarm and expose the public to danger.

The study investigated a narrow aspect of risk communication *vis-à-vis* disasters and emergencies and therefore recommends further studies to evaluate the national disaster and emergency preparedness programs in consonance with the International Strategy for Disaster Risk Reduction. As a baseline, exploratory study, it offers very good evidence on the public's behavior with respect to its receptivity to risk. If the public is ready to accept as true any risk information no matter the source, the danger in abusing the vulnerabilities of the public is immense. It is also possible that health risk information given by a quack from any source would interfere with conventional risk communication and thus rendering orthodox risk communication a wash during public health intervention.

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