

The fear of natural disaster caused by flood

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Abstract: The subject of quantitative research is a determination of fear level of natural disaster caused by flood and examination its relationships with demographic and socio-economic characteristics of citizens. The aim of such research is a scientific explanation relationships nature of these characteristics and fear. In order to realize research, randomly was selected nineteen communities in which was surveyed 2,500 persons in 2015. On that occasion, it was applied test strategy in households for the application of the multi-stage random sample. According to the survey, 49.7% of respondents said they feel fear, 16.1% were not sure, and 33.2% do not feel the fear of natural disasters caused by flooding. In addition, the results indicate that there is a statistically significant correlation between the fear to sex, age, education, marital status, employment status, income level, swimming abilities and the type of ownership of the facility in which to live, until such a relationship does not exist with level of religiosity and success in high school. Social and scientific justification of the research arising from the necessity to examine the situation and the level of citizens' fear of natural disaster caused by flood with a view to taking some proactive measures aimed to offset the fear by taking certain measures of preparedness to react in such situations. The research results might be used in planning the psychological help and support to citizens in the stages of preparation, response and recovery from natural disasters.

Keywords: security, natural disaster, citizens, fear, floods, demographic and socio-economic characteristics.

INTRODUCTION

Nowadays, after all the media reports about natural disasters all around the world, it is difficult to imagine a man that has not at least once considered the consequences of such events. The researchers approached testing the fear of natural disasters from many different perspectives. Slovic and co-authors [1] have determined, by identifying the determinants of the risk perceived, that fear has the greatest impact on the risk perception. Kirkwood [2] suggests that models of ecological dangers may not provide an accurate review of risk for local citizens. He suggests that when we fail to announce clearly the nature of the ecological risks, civil servants and citizens equally can have a false feeling of security or, if the risk is overrated, it can consequently cause fear. Citizens who are informed on time about the upcoming natural disaster through the warning and notification systems will not feel such fear because they know everything will go according to the pre-established procedures [3]. Fear of the natural disasters is a specific problem during their management. It has been determined that people who develop constructive defense mechanisms probably fight against fear within themselves in a socially acceptable manner. On the other hand, there are individuals who fight against fear by denying the existence of a threat, rejecting all information about the danger or using other undesirable mechanisms [4-6]. Such mechanisms have a tendency of being self-destructive and asocial. There are some research papers in which the connection between the fear [7-11] and citizens' willingness to react in natural disasters [7-11] is examined. Dolej and co-authors [8] have determined a positive correlation of fear and community's willingness to react during an earthquake. Russell and co-authors [10] emphasize that a high level of personal uneasiness, measured as the common thinking about the earthquake, significantly influences readiness for a disaster. Jackson and Mukurje [15] suggest that expectations about future consequences of the earthquake [16, 17] do not affect the adoption of readiness to react. Cvetkovic and co-authors [18] claim that there is no statistically significant

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connection between fear of natural disasters and perceptions, knowledge and understanding of safety procedures for reacting in natural disasters [19] caused by the earthquake.

METHODOLOGICAL RESEARCH

Sample of respondents

For the purposes the survey realization, statistical method and the method of empirical generalization stratified the local communities with high and low risk of flooding in the Republic of Serbia. Thus the stratum was obtained, i.e. population that consisted of adult residents of local communities where flooding took place or existed a risk of flooding. Using the random sampling method, 19 out of 154 communities with the induced risk of flooding were chosen from the resulting stratum. The research included following communities: Obrenovac, Sabac, Krusevac, Kragujevac, Sremska Mitrovica, Priboj, Batocina, Svilajnac, Lapovo, Paracin, Smederevska Palanka, Jasa Tomic, Loznica, Bajina Basta, Smederevo, Novi Sad, Kraljevo, Rekovac and Uzice (Picture 1).



Picture 1 - Map overview of geospatial disposition of surveyed correspondents by local communities in the Republic of Serbia

The multilevel random sampling was used in the further procedure. In the first stage were determined the parts in the administrative headquarters which were threatened by a hundred-year-old water or by a potential risk of high water. In the second stage streets and their parts were established, and in the third stage were determined the households in which the survey was conducted. The number of households was coordinated with the size of the community. The fourth stage of sampling referred to the procedure of respondent selection within previously defined household. The respondent selection was conducted using the random sampling method on the adult household members who were present at the time of the survey. 2500 citizens were involved in the survey (Table 1).

Table 1 - Structure overview of features of local communities in which it is conducted citizen surveys

Municipality	Total area u km2	Settlements	Population	Number of households	Number of respondents	Percentages (%)
Obrenovac	410	29	72682	7752	178	7,71
Sabac	797	52	114548	19585	140	6,06
Krusevac	854	101	131368	19342	90	3,90
Kragujevac	835	5	179417	49969	91	3,94
Sremska Mitrovica	762	26	78776	14213	174	7,53
Priboj	553	33	26386	6199	122	5,28
Batocina	136	11	11525	1678	80	3,46
Svilajnac	336	22	22940	3141	115	4,98
Lapovo	55	2	7650	2300	39	1,69
Paracin	542	35	53327	8565	147	6,36
Smed. Palanka	421	18	49185	8700	205	8,87
Secanj - Jasa Tomic	82	1	2373	1111	97	4,20
Loznica	612	54	78136	6666	149	6,45
Bajina Basta	673	36	7432	3014	50	2,16
Smederevo	484	28	107048	20948	145	6,28
Novi Sad	699	16	346163	72513	150	6,49
Kraljevo	1530	92	123724	19360	141	6,10
Rekovac	336	32	10525	710	50	2,16
Uzice	667	41	76886	17836	147	6,36
In total	10784	634	1500091	283602	2500	100

Table 2 gives a detailed structure overview of the interviewed citizens. The implementation of these sampling techniques provided solid representation of the sample; sample size provided reliability in the conclusion regarding the basic set - population.

Table 2 – Structure overview of the sample of interviewed citizens.

Variables	Categories	Frequency	Percentages (%)
Gender	Male	1244	49,8
	Female	1256	50,2
Years of age	From 18 to 28 years	711	28,4
	From 28 to 38 years	554	22,2
	From 38 to 48 years	521	20,8
	From 48 to 58 years	492	19,7
	From 58 to 68 years	169	6,8
	Over 68 years	53	2,2
Level of education	Primary school	180	7,2
	Three-years-long secondary education	520	20,8
	Four-years-long secondary education	1032	41,3
	College (three years)	245	9,8
	Faculty (four years)	439	17,6
	Master	73	2,9
	Doctor of science (PHD)	11	0,4
Marital status	Single	470	18,8
	Related	423	16,9
	Engaged	67	2,7
	Married	1366	54,6
	Divorced	99	4,0

	Widow / widower	75	3,0
Distance household from the river	Up to 2 km	1479	59,2
	From 2 to 5 km	744	29,8
	From 5 to 10 km	231	9,2
	Over 10 km	46	1,8
Number of household members	Up to 2 member	63	2,5
	From 2 to 4 members	1223	48,9
	From 4 to 6 member	639	25,6
	Over 6 member	575	23,0
Employment	Employed	1519	60,8
	Unemployed	883	35,3
Size of flat/house	Up to 35m ²	128	3,9
	From 35 to 60m ²	237	7,2
	From 60 to 80m ²	279	8,5
	From 80 to 100 m ²	126	3,9
	Over 100m ²	45	1,4
Incomes	Up to 25,000 dinars	727	29,1
	Up to 50,000 dinars	935	37,4
	Up to 75,000 dinars	475	19,0
	Over 90,000 dinars	191	7,6

RESULTS AND DISCUSSION

Using the chi-squared test of independence (χ^2), the connection between the fear of natural disaster caused by flooding (hereinafter referred to as a natural disaster) and the following variables: gender, age, level of education, marital status, employment, incomes, swimming skills, object ownership, level of religiosity and secondary school achievements (Table 3). On that occasion, additional assumptions were fulfilled about the expected minimum frequency in all areas that were five and above. The results of descriptive statistical analysis are presented in figure 2. 49.7% out of the total of 2500 respondents claimed that they felt fear, 16.1% were not sure and 33.2% did not feel fear of natural disaster.



Figure 2 - Percentage distribution of the fear of natural disasters caused by flood

Gender of respondents – the results of the chi-squared test of independence (χ^2) indicated that there was a statistically significant connection between the respondents' gender and the fear of the natural disasters ($p = 0,000$) (Table 3). Previous conclusion logically raises the question of the strength of such connections. Based on the empirical rule which says that coefficient value V 0 – 0,03 indicates a low correlation, 0,3 – 0,6 medium correlation and V value over 0.6 indicates excessive correlation among variables, it can be said that there exists low correlation ($V = 0.113$) (Table 3). In relation to gender, men (51.1%) in a slightly greater extent than women (49.4%) feel the fear of natural disasters. It can be assumed that men in greater extent feel fear because the financial burden of recovery often falls on them, and as being the stronger gender, they are in charge of the family's safety.

Years of age - the results of the chi-squared test of independence (χ^2) indicated that there existed a significant correlation between the respondents' age and the fear of natural disaster ($p=0.000 < 0.05$). Also existed low correlation ($p = 0.113$) (Table 3). By using the cross-tabulation of fear and the respondents' age, it was determined that the fear was felt with: 39.9% of respondents aged from 18 to 28, 51.3% of respondents aged from 28 to 38, 52.6% of respondents aged from 38 to 48, 54.3% of respondents aged from 48 to 58, 62.5% of respondents aged from 58 to 68 and 33.3% of respondents aged from 78 to 90. Judging by the obtained results, most of the respondents aged from 58 to 68 felt fear. Unlike them, the lowest level of fear was present among the respondents aged from 78 to 90. Younger people assumed that it would be easier to deal with the consequences of the natural disasters, starting with their psycho-physical abilities. On the other hand, older people often have limited ability to move around, decreased quality of senses, addiction to medicaments, etc.

Level of education - the results of the chi-squared test of independence (χ^2) indicated that there existed a significant correlation between the respondents' level of education and the fear of natural disaster ($p = 0.021 < 0.05$). Also existed low correlation ($p = 0.069$) (Table 3). By using the cross-tabulation of fear and the respondents' level of education, it was determined that the fear was felt with: 53.4% of respondents with primary education, 53% of those with three-years-long secondary education, 49.6% of those with four-years-long secondary education, 44.5% of respondents with higher education, 52.1% with high education, 42.9% of respondents with finished master studies and 11.1% of respondents who finished PhD studies. According to the results, the majority of respondents (53.4%) with primary education felt the fear of natural disasters. Respondents who completed PhD studies felt fear in the smallest number (11.1%).

Marital status - the results of the chi-squared test of independence (χ^2) indicated that there existed a significant correlation between the respondents' marital status and the fear of natural disaster ($p=0.000 < 0.05$). Also existed low correlation ($p = 0.111$) (Table 3). By using the cross-tabulation of fear and the respondents' marital status, it was determined that the fear was felt with: 46.1% of respondents that were in no way related, 38% who were in a relationship, 56.9% of respondents who were engaged, 53.6% of respondents who were married, 52.5% of respondents who were divorced and 73.3% of respondents who were widowed. Most of the respondents who were widowed (73.3%) felt fear. The explanation can be found in the lonely lives of widows/widowers who can no longer rely on their partners. On the contrary, the smallest level of fear can be found among the respondents who are in not any way related (46.1%). Citizens who do not have anyone to take care of feel fear to a lesser extent because they have to care only about themselves.

Employment - the results of the chi-squared test of independence (χ^2) indicated that there existed a significant correlation between the respondents' employment and the fear of natural disaster ($p = 0.040 < 0.05$). Also existed low correlation ($p=0.052$) (Table 3). By using the cross-tabulation of fear and the respondents' employment, it was determined that the fear was felt with: 50% of employed respondents and 48.6% of unemployed respondents. Most of the respondents who felt fear were employed. It is assumed that the employed respondents are in the greater extent familiar with the process or they have undergone the appropriate training of dealing with the natural disasters so they are aware of possible dangers.

Incomes - the results of the chi-squared test of independence (χ^2) indicated that there existed a significant correlation between the respondents' incomes and the fear of natural disaster ($p = 0.025 < 0.05$). Also existed low correlation ($p = 0.056$) (Table 3). By using the cross-tabulation of fear and the respondents' incomes, it was determined that the fear was felt with: 52.5% of those with the incomes of up to 25,000 dinars, 54% of those with incomes up to 50,000 dinars, 48.2% of those with incomes of up to 75,000 dinars and 43.3% of those with incomes over 90,000 dinars. Most of the respondents with incomes up to 50,000 dinars (54%) felt fear, unlike those with the incomes over 90,000 dinars (43.3%). Those results are logical bearing in mind that those respondents with higher incomes can easier cope with all the primary and secondary consequences of natural disasters.

Swimming skills - the results of the chi-squared test of independence (χ^2) indicated that there existed a significant correlation between the respondents' swimming skills and the fear of natural disaster ($p = 0.000 < 0.05$). Also existed low correlation ($p = 0.113$) (Table 3). By using the cross-tabulation of fear and the respondents' swimming skills, it was determined that the fear was felt

with: 48.1% of respondents who said they were swimmers and 54.7% of respondents who said they were non-swimmers. Small number of swimmers felt the fear of natural disasters. It can be said that the possibility of survival during floods due to swimming ability causes the presence or absence of fear, which is already known to some extent.

Religiosity level - the results of the chi-squared test of independence (χ^2) showed no significant correlation between the respondents' religiosity and the fear of natural disaster ($p = 0.025 < 0.05$). By using the cross-tabulation of fear and the respondents' religiosity, it was determined that the fear was felt with: 48.1% of respondents who were absolutely irreligious, 45.1% of respondents who were irreligious to a certain degree, 51.8% of respondents who were neither religious or irreligious, 48.1% of respondents who were religious to a certain extent and 55.7% of the respondents who were absolutely religious.

Type of ownership over the facility - the results of the chi-squared test of independence (χ^2) indicated that there existed a significant correlation between the respondents' ownership over the facility and the fear of natural disaster ($p = 0.000 < 0.05$). Also existed low correlation ($p = 0.081$) (Table 3). By using the cross-tabulation of fear and the respondents' ownership, it was determined that the fear was felt with: 56.8% who lived in the house, which was their property, 47.9% of respondents who lived in the house which was owned by a family member and 44.7% of respondents who lived in the house that was owned by a third party. Most of the respondents who lived in their own house felt fear. Property owners must deal with the consequences of the natural disasters, which confirms the logic of the results obtained. Consequently, the majority of owners feel fear.

Success in secondary school - the results of the chi-squared test of independence (χ^2) showed no significant correlation between the respondents' religiosity and the fear of natural disaster ($p = 0.122 < 0.05$). By using the cross-tabulation of fear and the respondents' secondary school success, it was determined that the fear was felt with: 41.7% of respondents who graduated as fair students, 53.1% of the respondents who graduated as good students, 51% of the respondents who graduated as very good students and 51% of the respondents who graduated as excellent students.

Table 3. Chi-squared test of independence (χ^2) of fear and interviewed independent variables

	value	df	Asymp. Sig. (2 - sided)	Cramers coefficient
Gender of respondents	31,563	2	,000*	,113
Years of age	90,882	12	,000*	,135
Level of education	23,918	12	,021*	,069
Marital status	60,919	10	,000*	,111
Employment	6,422	2	,040*	,052
Incomes	14,415	6	,025*	,056
Swimming skills	30,612	2	,000*	,113
Type of ownership over the facility	32,186	4	,000*	,081
Religiosity level	15,537	8	,058	,057
Success in high school	12,706	8	,122	,052

* Statistically significant correlation - $p \leq 0.05$

Conclusion

By examining the level and factors of influence on the fear of the natural disaster caused by flooding, it has been established that out of 2500 respondents, 49.7% feel fear, 16.1% is not sure and 33.2% do not feel fear. Judging by the results, the majority of respondents feel fear. Results of examining the influence of different factors (demographic and socio-economic) indicate that there exists statistically significant connection between fear and gender, age, education, marital status, employment, incomes, swimming skills, whereas such connection does not exist between religiosity level and ownership. Namely, men in a slightly greater extent than women feel fear of the natural disaster. On the other hand, women to a greater extent are not sure whether they feel fear or not. Citizens aged among 58 to 68 years of life feel fear to a greater extent unlike those among 79 to 90 years of life, who feel minimum fear. Most of the respondents with primary education feel the fear of natural disaster, unlike the respondents who completed PhD studies.

Most respondents that are widowed feel fear. Employed respondents feel fear to great extent. Most respondents with the incomes up to 50,000 dinars feel fear, unlike those with the incomes over 90,000 dinars. Swimmers feel fear of the natural disaster to a lesser extent. Most of respondents who live in their own property feel fear. Finally, by using the cross-tabulation of fear and the respondents' secondary school success, it is determined that the fear is felt with: 41.7% of respondents who graduated as fair students, 53.1% of the respondents who graduated as good students, 51% of the respondents who graduated as very good students and 51% of the respondents who graduated as excellent students. The results indicate the importance of further research of fear of the natural disasters with the aim of taking certain preventive measures focused on its reduction.

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Strah od prirodne katastrofe izazvane poplavom

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Sažetak: Predmet kvantitativnog istraživanja predstavlja utvrđivanje nivoa straha od prirodne katastrofe izazvane poplavom i ispitivanje njegove povezanosti sa demografskim i socio-ekonomskim karakteristikama građana. Cilj takvog istraživanja predstavlja naučna eksplanacija prirode povezanosti navedenih karakteristika i straha. U cilju realizacije istraživanja, metodom slučajnog uzorka, odabrano je devetnaest lokalnih zajednica u kojima je anketirano 2500 građana u toku 2015. godine. Tom prilikom, bila je primenjena strategija ispitivanja u domaćinstvima uz primenu višestepnog slučajnog uzorka. Sudeći po rezultatima istraživanja, 49,7% ispitanika ističe da oseća strah, 16,1% nije sigurno, i 33,2% ne oseća strah od prirodne katastrofe izazvane poplavom. Pri tome, rezultati ukazuju da postoji statistički značajna povezanost straha sa polom, godinama starosti, obrazovanjem, bračnim statusom, statusom zaposlenosti, visinom prihoda, plivačkim sposobnostima i vrstom vlasništva nad objektom u kojem se živi, dok takva povezanost ne postoji sa nivom religioznosti i uspehom u srednjoj školi. Društvena i naučna opravdanost istraživanja proizilaze iz neophodnosti ispitivanja stanja i nivoa straha građana od prirodnih katastrofa izazvanih poplavom sa ciljem preduzimanja određenih proaktivnih mera usmerenih ka kompenzaciji straha kroz preduzimanje određenih mera spremnosti za reagovanje u takvim situacijama. Rezultati istraživanja mogu se iskoristiti u koncipiranju psihološke pomoći i podrške građanima u fazama pripreme, odgovora i oporavka od posledica prirodnih katastrofa.

Ključne reči: bezbednost, prirodne katastrofe, građani, strah, poplave, demografske i socio-ekonomske karakteristike.

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