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Perception of the climate risk phenomena in Suceava municipality and surrounding areas

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Abstract: This study is the first to date which addresses the issue of public perception of meteorological and climate risks in the city of Suceava and surrounding areas and among the few studies on this topic conducted at the national level. The aim of the study is to explore from several perspectives the impact of severe atmospheric phenomena on the social and economic environment of Suceava and its surroundings, but also the way in which the population relates to them. The study is based on an online survey (January 2021) regarding the meteorological-climate risk phenomena that occur in Suceava and the neighboring localities respectively, which was applied to a number of 514 inhabitants who have permanent or temporary residence in this area. The survey contains 29 items; of these, one item required additional clarification, which was obtained by asking a complex question to an additional number of 253 respondents (May-June 2021). The respondents belonged to several age groups and socio-professional categories. Based on the received answers, we constructed a complex picture of the way in which the population of Suceava and the neighboring suburban localities relate to these dangerous phenomena, which can be useful both scientifically and in practice by the authorities. We found that the population of Suceava is familiar at an average to good level with the issue of meteorological-climatic risks.

1. Introduction

Perception of meteorological-climatic risks by the population of a territory is of great importance. A correct and real perception of such risks by an informed and educated population, aware of the importance of this problem, might be the key for solving many organizational issues and taking effective, correct and well-proportioned anti-crisis, synchronous or post-crisis measures. The perception of meteorological-climatic risks cannot be separated from the major topical concern of global warming. At the structural level we can separate it into several levels of analysis.

A first level is that of the authorities. Romanian decision-makers are primarily concerned with climate change. This is a well-known issue at the institutional level, within the Ministry of Environment, Waters and Forests, and is clearly defined as the following domains of action: the Atmosphere / Pollution Domain (regulated by laws: 104/15.06.2011 - on ambient air quality, 2008/50/CE - on ambient air quality and cleaner air for Europe; directive 2004/107/CE - on arsenic, cadmium, mercury, nickel, polycyclic aromatic hydrocarbons in ambient air) and the Climate Change Domain, where *Climate Change Strategy (2013 - 2020)* from 2013 *and National Climate Change Action Plan 2016 - 2020* from 2015 have been implemented.

A second level is that of scientific research. Climate warming in Romania (with changes in the patterns of severe atmospheric phenomena) is a reality confirmed by

numerous local studies (Mihaila and Tanasa, 2005; Briciu, 2017), regional (Croitoru and Piticari, 2012; Mihaila and Briciu, 2012; Ontel and Vladut, 2015; Micu et al., 2017), national (Croitoru et al., 2012; Croitoru et al., 2016; Banc et al., 2020) and in Central and Eastern Europe (Luterbacher et al., 2004). These studies directly relate atmospheric heating to the parameters of meteorological-climatic risk phenomenology. Researchers from the National Meteorological Administration, universities and institutions are constantly monitoring atmosphere warming and the associated risk phenomena.

On a third level of analysis there is the society as a whole, namely common people with their more or less objective perception of the addressed issue. The most realistic knowledge and perception of climate dynamics, of severe atmospheric phenomena is to a lesser extent a characteristic of common people, who form the basis of a society. These people generally analyse and perceive in their own way (determined by a multitude of objective or subjective factors) the meteorological reality of the moment and not the climatic system in an imperceptible transformation, masked by the great temporal variability of its parameters. Daily weather patterns and especially severe weather episodes shape, by repetition and cumulation, the climatic opinions of population groups, regardless of their geographical position (Howe and Marlon, 2019). However, people's knowledge and perceptions about weather-climate changes and risks differ regionally, depending, next to the geographical factor, on a multitude of other factors such as economic, social and cultural. The opinion poll is a tool that allows a multi-perspective study of all the factors that contribute to the establishment in the collective mind of some perceptions, more or less close to the reality of the climate system. Among the first approaches of the Romanian specialists regarding the survey of public opinion based on a well-elaborated questionnaire on the perception of the climate risk phenomena at the national level, we mention Cheval`s work from 2003. References to global warming are also made in this study. A study of the perception of natural hazards in a less extensive area (Galati municipality) was completed in 2004, thus opening the way to conducting studies on the perception of risks by a specifically targeted human community (Cheval and Dragne, 2004). The analysis of the perception of some risk phenomena by Romanians was first performed as a secondary component within the study of severe meteorological phenomena that occurred for the first time in Romania, such as the tornado from Făcăieni in August 12, 2002 (Balteanu et al., 2004). As for improvements in the methodology of studying public perception of natural risks (including climatic) that affect a certain territory, we note a study focused to a higher degree on the risk perception methodology (Gotiu and Surdeanu, 2007). The most recent study on the perception of climate change in Romania was published in April 2022 by Cheval et al. and aims to highlight menu issues caused by climate change, the level of information of the population, the perceived impact and the psychological impact of climate change (Cheval et al., 2022).

The main aim of this study is to capture, from several perspectives, the impact of severe atmospheric phenomena on the social and economic environment in Suceava and its surrounding areas, and then to build a relevant picture of the public perception of meteorological-climatic risk phenomena in this area. The objectives of the study are as follows: i) quantify the level of anxiety of the population in relation to meteorological-climatic risk phenomena in the studied area; ii) assess the level of experience, knowledge and information of the population in relation to the meteorological-climatic risk phenomena in the studied area; iii) assess the population's trust in the authorities regarding the management of meteorological-climatic risks that occur in Suceava and surrounding areas, and iv) assess the availability of the population in Suceava and surroundings to volunteering activities in case of severe meteorological events.

2. Materials and Methods

2.1. Study area

The targeted study area is bordered (first based on topoclimatic criteria and second on administrative criteria) by the administrative limits of the UATs (Administrative Territorial Units) with which the municipality of Suceava is directly adjacent.

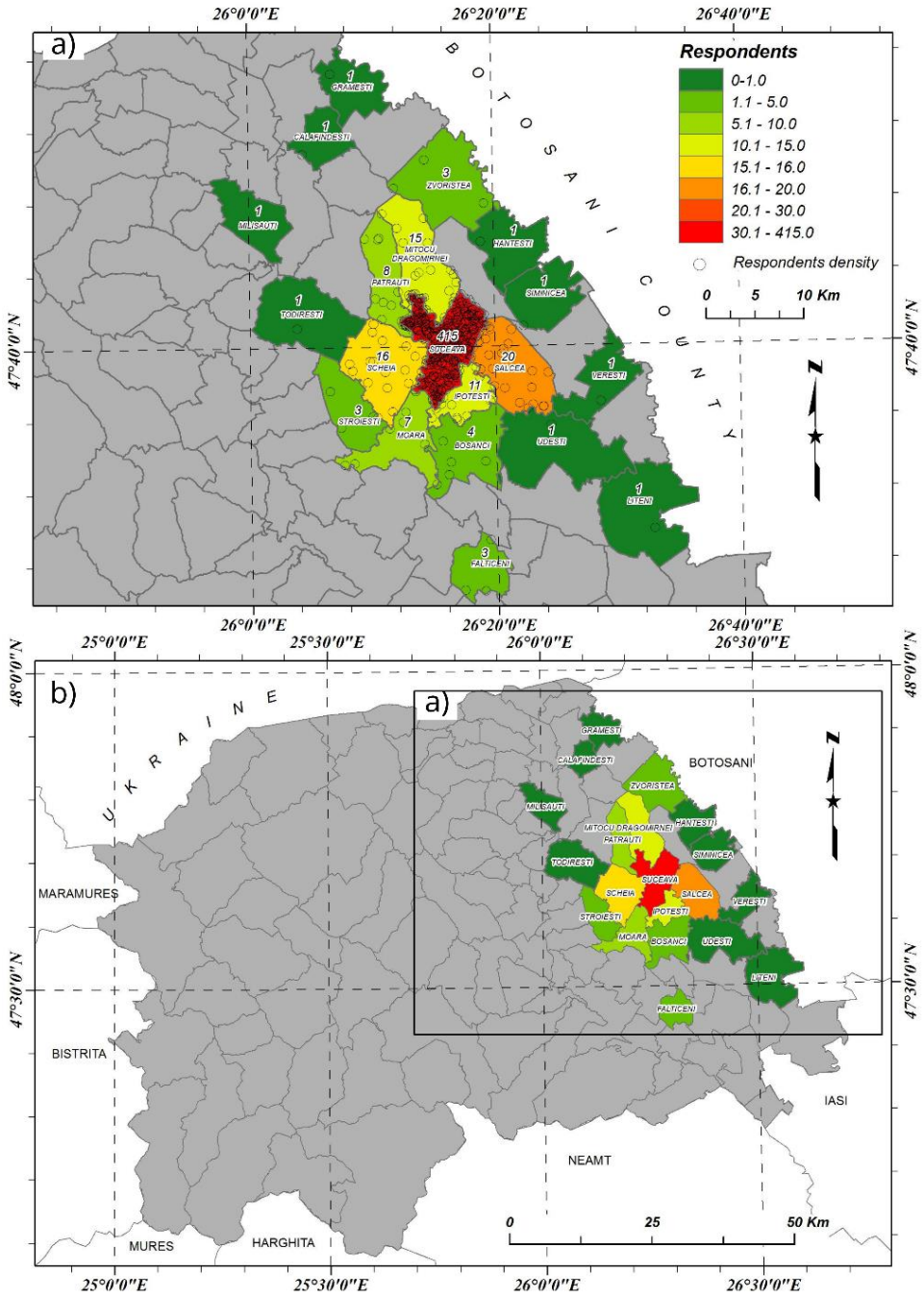


Figure 1. Area of origin of the 514 respondents from batch 1 and of those who answered in January 2021 the 29 additional questions of the applied questionnaire.

The area of origin of the respondents consists of a core (Suceava municipality with its districts) and two external parts: the first close to Suceava, consisting of neighboring suburban localities and the second further away, which includes respondents from non-neighboring localities, but located at maximum 30 km from the center of the Suceava municipality (Figure 1 and Table 1). All respondents were aware of the weather

and climate particularities of the Suceava metropolitan area, as they came in contact daily or at least every few days with it.

Table 1. Area of origin of the 253 respondents in batch 2 and of those who answered the question 20b between 1 May and 6 June 2021

Area of origin of respondents	Number of respondents
Suceava Municipality	118
Suburban localities	53
Nearby localities (maximum 30 km from Suceava)	82
Total	253

The territory and the researched issue are well covered by a representative number of respondents in terms of their density, social background, age, sex, occupational categories, etc. Statistically, the number of respondents from the county population are sufficient to have a confidence level of 98% that the real value is within ± 3,87% of the measured survey.

The large number of respondents, their diverse background, the diversity of questions they answered, support altogether the scientific relevance of the present study, but also its importance in terms of the management of meteorological-climatic risks in the area of Suceava municipality and its surroundings.

2.2. Methods and means

The questionnaire was the most important research tool. This was performed on the Google forms platform, and the access link was distributed to the respondents. The online questionnaire contained 29 + 1 categories of items and was completed by 514 + 253 respondents. The design of the questionnaire was also based on the structure proposed by Cheval, 2003 and Gotiu and Surdeanu, 2007 respectively, to which changes / additions were made. The items were grouped into five broad categories of information that provided us with data on: i) interviewees, ii) fear of risk phenomena, iii) level of experience, knowledge and information, iv) trust in authorities, v) availability to volunteering. The platform was accessible to respondents between January 2021 and 6 June 2021 for the 29 basic questions, and between 1 May and 6 June 2021 for the supplementary question.

2.3. Data obtained

Considering the complexity of the developed questionnaire and the answers provided by the large number of participants in this study, we believe that the data obtained are statistically and scientifically representative for the studied area.

2.4 Research methodology

The questionnaire was based on a set of comprehensive and complex questions - given the complexity and scope of the chosen topic - to cover the complexity of the meteorological-climatic risks in Suceava and the surrounding localities, but at the same time, to be understandable and answered within 10-15 minutes. Diverse questions were asked, often with a certain degree of overlap, in order to follow the consistency of the answers and the level of perception of the meteorological-climatic risks in the respondents. Regarding response options, the questions with half-constructed response prevailed, in which the respondents were suggested sets of answers, from which they could choose one or more options they considered valid. The questions which required original answers were few and raised problems in being quantified statistically. All the responses were converted by mathematical operations into points and then into percentages, which were scaled in the figures either at the threshold of 100% of the respondents or at their absolute number.

3. Results

3.1. Component I - data about the interviewees

This part included 5 questions. By place of origin, most of the respondents had their residence in Suceava municipality (77 %). Suburban areas (neighboring administrative units that have the same boundary with the municipality) were represented by 17 % of respondents, 3 % of them are from nearby localities and 3 % from remote rural areas (about 40-42 km distance from municipality). Regarding the age of the respondents, all the major age categories were represented, of which 54 % were up to 25 years old, 29 % adults (26-65 years old) and 17 % elderly people (over 85 years old). As for the permanent address of respondents at the time of applying the questionnaire, 64 % had permanent residence in Suceava or neighboring localities, 34 % had temporary residence in Suceava and 2 % lived in other localities, but were familiar with the climatic conditions of the study area. 38 % of the respondents were male and 62 % female. Relevant studies have shown that, next to age and experience, gender plays an important role in risk perception, with women generally being more concerned than men about climate risk (Lorencová et al., 2019). The status or occupation of the respondents is closely related to their age. Most of the interviewees (51 %) were pupils and students. A rather important percentage was represented by employees with higher education (24 %), 19 % of the respondents were retired and 6 % belonged to other occupational categories. Information about the occupation of the respondents can also subtly indicate their level of education. 51 % of them were actively involved in education, having access to data and information on weather and climate phenomena in the study area. According to Leiserowitz's study, people with higher levels of education are more likely to understand climate change than those who are less educated (Lee et al., 2015). To these were added a high percentage (24 %) of people with higher education, well informed and knowledgeable about the climate.

3.2. Component II - the population's fear of risk phenomena

It included two questions. Theoretically, the degree of fear should decrease with increasing level of training and community organization, but panic is related to the mental structure of each individual, and thus difficult to quantify at the level of a larger group of people.

However, to capture this aspect, Component II of the questionnaire included two specific questions. For the question: "*What is the most dangerous meteorological phenomenon you are afraid of?*" respondents were asked to choose an answer that quantifies the level of fear (from five options proposed by the authors of the questionnaire); for this question, 12 risk phenomena were selected by the authors as representative for the municipality of Suceava and surroundings. The summary of the responses to this question is given in the Table. 2.

According to the answers ranked in Table 2, the meteorological and climate phenomena that most respondents fear considerably are: storms associated with heavy and long rain, torrential rain and hail. The phenomena that the inhabitants of Suceava and its surroundings fear the least or not at all are fog, early or late frosts and regional warming.

The second question assessed the respondents' reaction in case of occurrence of a meteorological risk phenomenon. Thus, most of the 514 respondents said that they sometimes panicked due to the high severity of atmospheric phenomena, while others panicked only slightly. Together, these two categories account for 75.5 % of respondents. There is also the category of those who always panicked and who represent 1.8 % of the respondents. 8.2 % of respondents panicked most of the time and only 14.5 % opted for the “Never” option (Figure 2).

Table 2. Summary of answers (number of answers) to the question What is the meteorological phenomenon of risk that you fear the most?

Reported phenomenon	I'm not afraid at all / I'm a little afraid	I'm humanly afraid	I am quite afraid and very afraid
Drought	213	231	70
Torrential rain	165	204	145
Heavy rain	160	187	167
Cold waves (frost)	236	194	84
Heat waves	260	178	76
Blizzard	242	176	96
High wind speed	217	186	111
Thunderstorm	146	183	**185**
Fog	**401**	91	22
Hail	210	191	113
Frosts: early or late	390	100	24
Regional warming	298	149	67

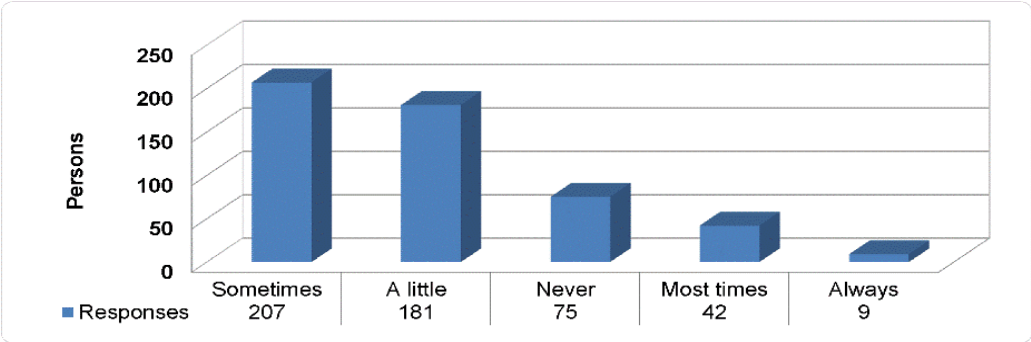


Figure 2. Numerical distribution of the respondents based on the answer given to question 7 *(In case of the occurrence of a meteorological risk phenomenon, do you panic?),* according to the 5 proposed response variants.

3.3. Component III - level of experience, knowledge and information

It included 18 main and several secondary questions. Regarding the level of experience, knowledge and information, it was observed that most material damages and victims occur as a result of a lack of information in the population and especially of the ignorance of the citizens regarding the warnings sent by specialized institutions.

The first question in this set (Have you or your family been affected by the occurrence of climate risk phenomenon/a?) aimed at determining the personal experience of the respondents in relation to the climate risk phenomena. Even though 58% of the respondents stated that they were not affected by severe meteorological phenomena, they may not have been fully aware or have not yet taken into account the impact these phenomena had on their lives or property. However, a significant percentage (36 %) was represented by those respondents who experienced going through a difficult period in which they (or their families) were affected by the occurrence of climatic risk phenomena. 6 % of respondents did not know how to provide an exact answer to this question.

Thus, depending on the answer given to the previous question, those 36% of respondents who personally experienced the effect of meteorological risk phenomena were addressed the requirement summarized graphically in Figure 3. They were asked to choose a maximum of five of the 14 meteorological-climatic risk phenomena proposed by the authors, and score them according to the importance / impact / consequences. The phenomena ranked first received 10 points in the analysis, while decreasing scores were given to those ranked lower, so that those ranked 5th received 6 points each. Points were

converted into percentage values from the total of responses. Thus, hail (by 24.8 %), thunderstorms (19.3 %) and drought (10.7 %) were by percentage the first three phenomena selected by respondents as the most relevant in the entire range of meteorological risk phenomena. Heavy rain, blizzard, high wind speed, cold waves etc. followed in the hierarchy (Figure 3).

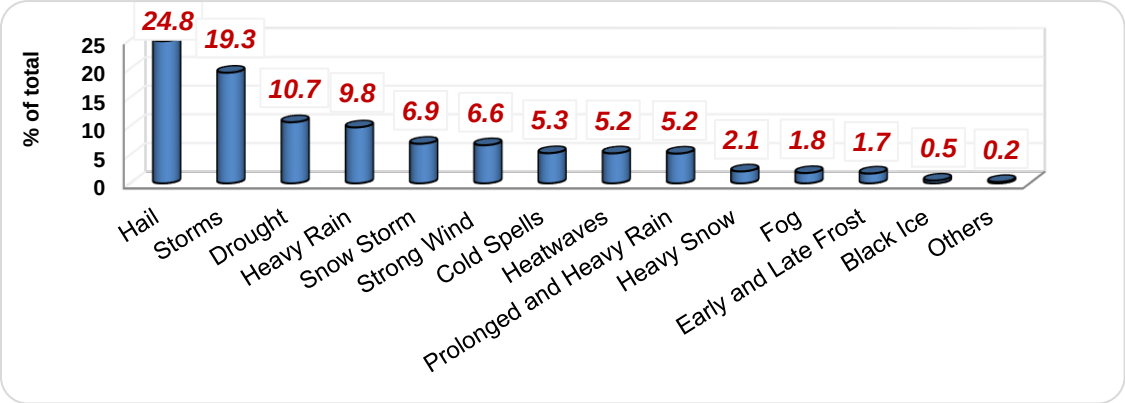


Figure 3. Percentage distribution (%) of the 14 meteorological-climatic risk phenomena proposed by the authors based on their ranking by respondents

Figure 4 shows the answers of all 514 respondents regarding their perception of the importance of the climatic risk phenomena that affect the neighbourhoods and localities bordering Suceava. Thus, the inhabitants of Suceava and neighboring localities considered that the meteorological climatic risk phenomena that most often affect the area where they live are hail, torrential rains, thunderstorms and drought (between which there are one percent differences), followed by high wind speed, blizzard, heat waves, cold waves, etc. The answers in Figure 4 complete and strengthen the importance and presence in people's lives of the same weather and climate phenomena that actually affected 36 % of respondents to the questionnaire (Figure 3) namely: hail, strong wind, heavy rain and drought.

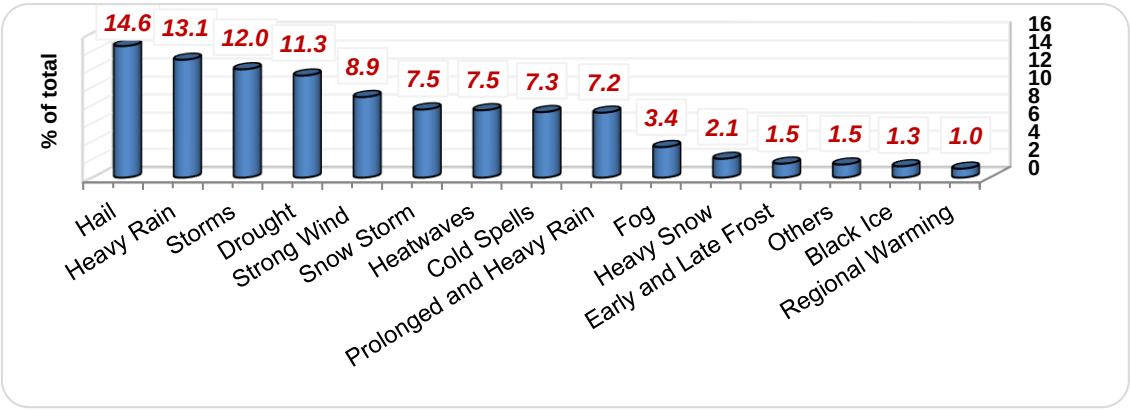


Figure 4. Percentage distribution (%) of the 14 meteorological-climatic risk phenomena proposed by the authors based on the answers provided by the 514 respondents to the question: *According to their importance, which do you consider to be the climatic risk phenomenon (a) that affects the neighborhoods and localities adjacent to Suceava the most? (1st place = 10 points, ..., 5th place = 6 points; points were converted as percentages of the total respondents' answers)*

The question *Do you follow weather patterns and weather forecasts presented in the media for the neighborhoods and localities adjacent to Suceava?* aimed to capture the level of information of the interviewed population regarding weather forecasts. 54 % of

the respondents stated that they sometimes follow the forecasts, 24 % do it regularly, 15 % very rarely and 5 % do not follow them at all. However, the answers of those who follow the forecasts, regardless of how often they do it, are a majority (78 %).

By summarizing the answers to the question: *If you follow weather patterns and weather forecasts for the neighborhoods and localities around Suceava in the media, check the source(s) (maximum two sources) of the media from which you get the most information (source 1 = 2 points ; source 2 was given 1 point; the points were converted into percentages of the total number of responses)* (Figure 5), we found that the main source of information of the respondents regarding weather patterns and forecasts is the Internet. This was expected in the context of advancing technology through mobile applications, which provide real-time weather information and increasingly accurate forecasts. Central and local TV stations, as well as local and central radio stations were next on the list of preferred information sources of the respondents. Printed newspapers were at the time of the survey the least important source of meteorological information, probably due to the fact that they are predominantly used by the elderly and due to the higher acquisition costs.

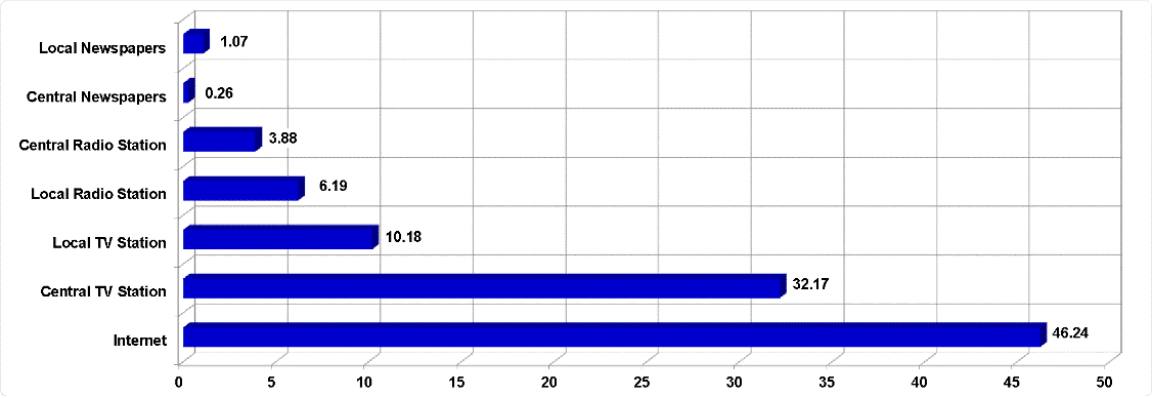
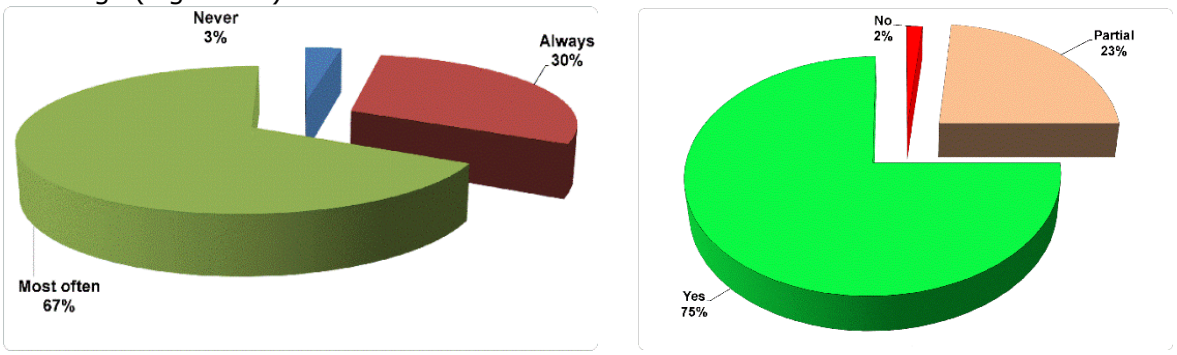


Figura 5. Percentage distribution (%) of the 7 categories of information sources proposed by the authors, based on the responses provided by the survey participants

The inhabitants of Suceava and neighboring localities consider the alerts sent by the National Meteorological Administration (ANM), with 97 % of the respondents taking into account (always or most often) these alerts. Only 3 % of respondents' disregard ANM warnings (Figure 6a).



(a) (b)

Figure 6. Percentage distribution (%) of the respondents based on their answers to the questions: (a) Do you take into account the alerts sent by ANM? and (b) Do you understand the meaning of weather alert color codes?

Regarding the understanding of the meaning of meteorological color codes, 75 % of the interviewed population answered that they understand them, 23 % only partially

know the meaning of color codes and 2 % of them answered that they do not know them (Figure 6b).

The question *If dangerous weather-climatic phenomena (storms, lightning strikes, torrential rain - floods) occur, would you know what to do?* aimed to test whether the respondents know what they should do in case of occurrence of such phenomena. 41 % of respondents answered yes, 55 % answered that they know only partially how to manage the dangerous situation and only 4 % of them admitted that they do not know how to act in such situations.

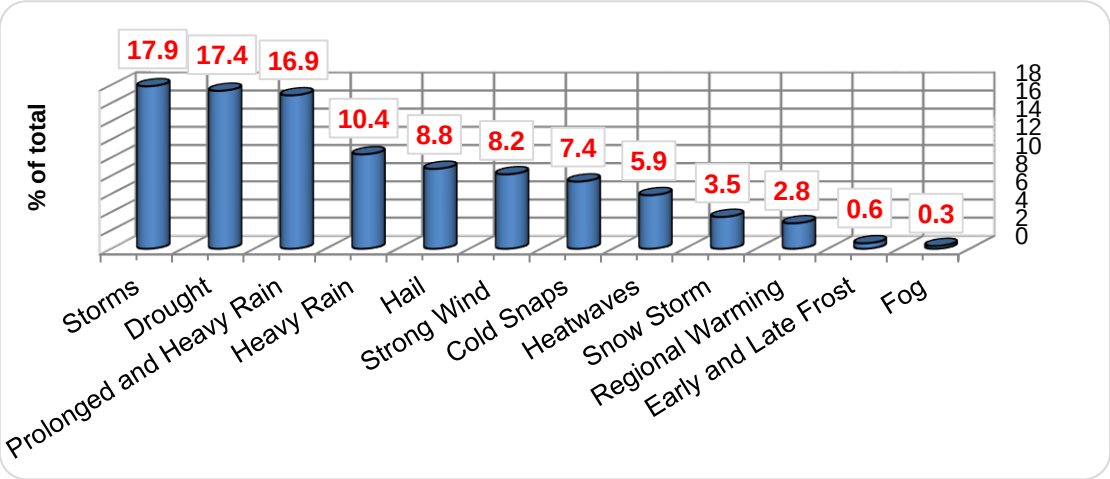


Figura 7. Percentage distribution (%) of the 12 meteorological-climatic risk phenomena proposed by the authors, based on the responses of the survey participants

The question: *From the list below, select two risk phenomena that you consider the most dangerous (the phenomenon ranked first = 2p; the one ranked second = 1p; the points were converted into percentages of the total responses)* asked the respondents to selected from a given list of risk phenomena two that they considered the most dangerous. This question also aimed to check the consistency of the respondents' perception regarding the ranking of meteorological-climatic risk phenomena in Suceava, which was also tested by analyzing the statistics in Figures 3 and 4. There are differences in ranking between the results given in Figures 3, 4 and 7. But the results are largely compatible. Storms, drought, long and heavy rainfall, torrential rains and hail occupied the top five places in the hierarchy of dangerous phenomena.

When asked to list two measures one should take in the case of occurrence of a severe weather-climate phenomenon (*List two of the measures you think you should take in the event of dangerous weather phenomena*) a large part of the respondents (48 %) could not provide at least two concrete measures to get them out of the critical situation. Eventually, when they are put in a position to make concrete, implementable and substantial decisions, a good part of the people of Suceava cannot achieve this. 52 % of respondents proposed an extremely diverse range of measures, difficult to assess statistically and much more difficult to implement in practice.

The respondents were then asked *if the Suceava community (in Suceava and neighboring localities) has a direct or indirect influence on the weather / climate patterns and the occurrence of dangerous events*. 46.1 % of the respondents considered that society induces a partial influence, 5.8 % believed that it induces a strong influence, 32.9 % did not know or could not answer and 15.2 % of them considered that there is no influence of the Suceava community on weather and dangerous events in this area. The answers indicate a perception of a medium to high level of the role played by the human community in amplifying or diminishing the characteristics of severe meteorological-climatic phenomena in an area.

Most of the respondents (91.2 %) see extreme climate phenomena as damaging and dangerous, and are aware of the impact of these phenomena on their lives (Figure 8).

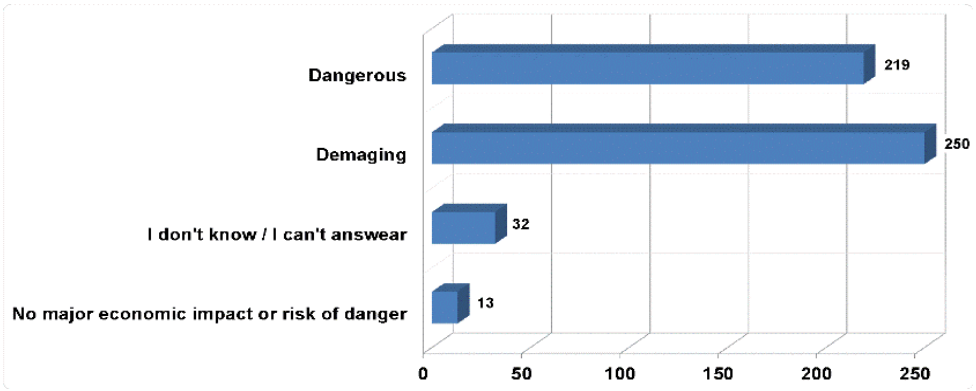


Figure 8. Percentage distribution (%) of the respondents for the 4 categories of answers proposed by the authors, to the question: *Choose the option that seems more real to you: Do you consider climate extremes as…*

Respondents were asked by the authors to rank 12 proposed risk phenomena according to their importance (Figure 9). Respondents had difficulty understanding this question, hence some answers deviate from the answers in similar questions.

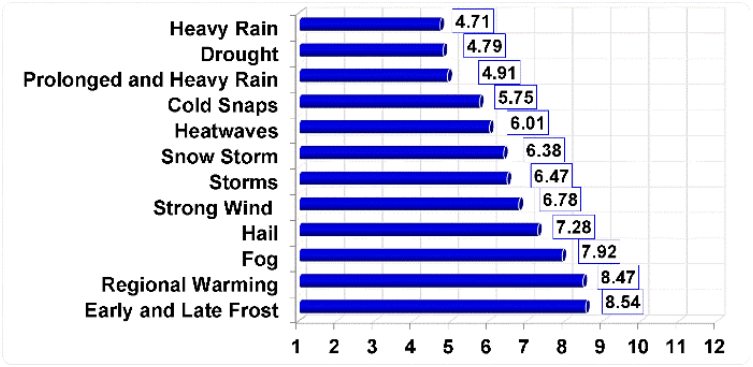


Figure 9. Ranking by the respondents of the 12 proposed risk phenomena, according to the answers provided to the question: *Rank the following 12 meteorological-climatic phenomena (from rank 1 to rank 12) according to their impact on your living environment (ranks 1, 2, 3 ...- higher impact, i.e., the most dangerous / damaging phenomena; ranks ... 10, 11, 12 - lower impact, i.e., the least dangerous / damaging phenomena)*

According to the survey respondents, torrential rain was the most dangerous / damaging weather-climate phenomenon, with the strongest impact on their living environment. The impact of drought, heavy and prolonged rain, as well as cold and heat waves was also considered important. Fog, regional warming and early or late frost were ranked last. The list of the 12 risk phenomena also included: blizzard, storms and high wind speed. It is very difficult to explain why in this ranking (Figure 9) hail was placed only 9th as importance, while in the other figures it had more important places (Figures 3 and 4 - rank 1; Figure 10 - rank 3; Figure 7 - rank 5).

In order to obtain a more accurate ranking, based on scientific criteria, between May 1 and June 6, 2021, an additional questionnaire was launched online with the participation of 253 inhabitants from Suceava and surrounding areas (other than the 514 initial respondents). The authors of the questionnaire chose 14 climate risk phenomena that the respondents passed through the Bryant E.'s criteria, giving them grades from 1 to 5: grade 1 for the most severe / dangerous / damaging phenomena, ..., grade 5 for the least severe / dangerous / damaging phenomena. The 9 criteria chosen in the Bryant classification were: the severity of the phenomenon (1), the duration of the event (2), the total area affected (3), the total number of deaths (4), the total economic damages (5), the social effect (6), the long-term impact (7), the speed of occurrence of the event (8) and the occurrence of associated phenomena (9) (Bryant, 1991). The respondents of this

questionnaire assessed cold waves and negative temperature singularities (temperature below -20°C) as the most severe / dangerous / damaging weather-climate phenomena in this area, and hence gave them the lowest scores (2.41 points). Torrential rainfall associated with the activity of atmospheric fronts (generalized frontal rainfall) and hail were placed second with 2.80 points. Heat waves and positive temperature singularities, violent winds and storms as well as drought also obtained scores of up to 3.00 (Figure 10).

The last on the list were phenomena such as: thick snow layer (3.39 points), temperature inversions and thick layers of frost / glazed ice (3.54 points each).

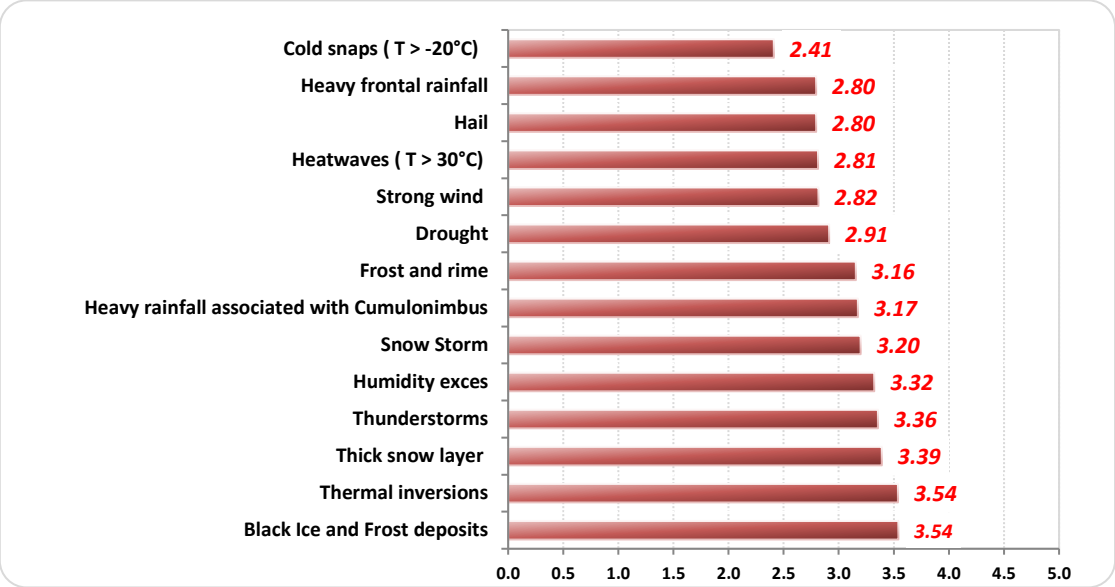


Figure 10. Synthesis of responses to the item: *Rank from 1 (the most severe) to 5 (the least severe) the following 14 meteorological risk phenomena occurring in the area where you live, according to Bryant's criteria (1991)*

Another question assessed the extent to which the respondents were affected by the negative manifestations of the weather. Most of the respondents stated that weather manifestations affect them directly, most often generating mental and physical discomfort, and sensitivity to weather conditions often generates worsening of symptoms of some health conditions. Respondents are aware that negative weather events caused property damage and favored road accidents.

In the context of an event that could endanger their health, life and property, 62.2 % of respondents said they would take specific protection measures, 20 % would use life insurance and only 10.9 % considered insurance of goods as a protective measure (Figure 11).

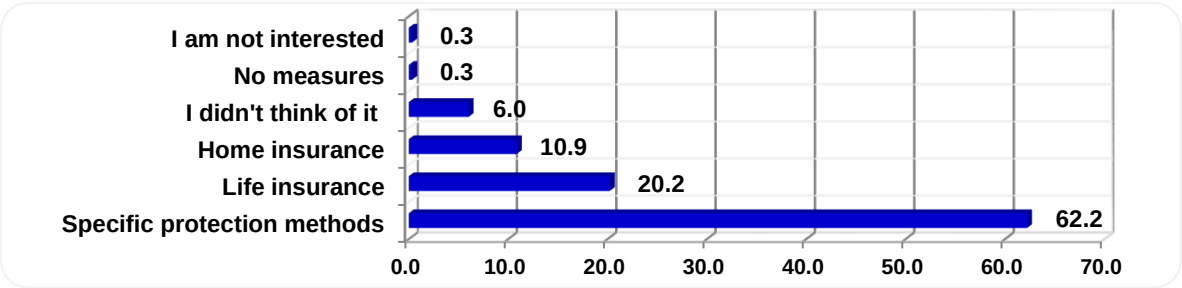


Figure 11. Percentage distribution (%) of the respondents based on their answers to the previously described item which contained 6 possible answers

To the question: *If a dangerous meteorological phenomenon is predicted to occur in the locality where you live, are you willing to leave the locality until the phenomenon ends?* the most respondents (74 %) said they would leave the locality voluntarily or only on the recommendation of the authorities; however, there were respondents who would refuse to leave their homes, unless forced to do so by the authorities (Figure 12).

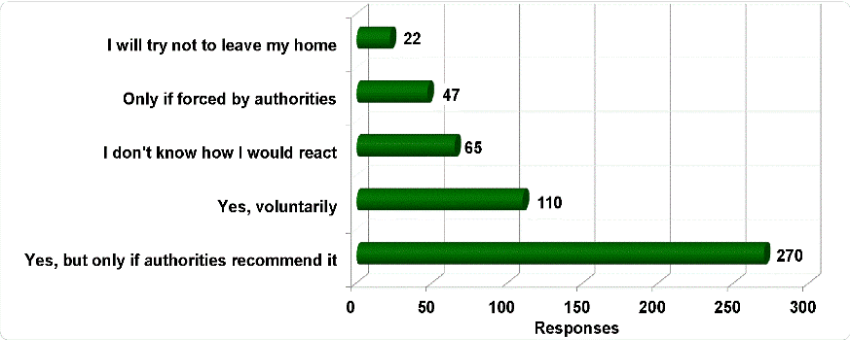


Figure 12. Numerical distribution (number of people) of the respondents, according to the answers provided to the previous item, for the 5 categories of answers proposed by the authors

The 514 respondents, both residents of Suceava and of the neighboring localities, had different opinions regarding the organization of their community for mitigation of the negative effects of weather and climate. Only 23 % of the respondents answered that the civil society of Suceava is organized to control severe meteorological-climatic phenomena, 20 % considered that it is not prepared and 57 % did not know what to answer to this question. The opinion of 77 % of respondents thus suggests that at the community level there is no proper organization for the management of weather and climate crises.

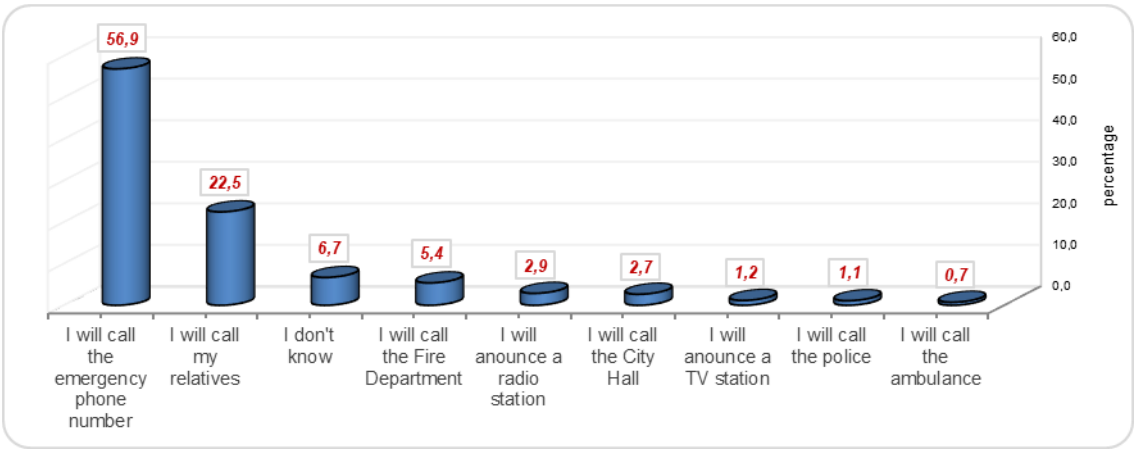


Figure 13. Percentage distribution of respondents, on the 7 categories of answers proposed by the authors, based on the answers provided to the question: *If a weather-climate disaster occurs, you choose to do the following: 9 alternative answers were proposed by the authors, the first alternative answer was given 4p, ..., the fourth answer 1p (points were converted to percentages of the total answers).*

In general, in order to report the occurrence of a weather-climate disaster, the majority of respondents said that they would use the emergency number 112 (56.9 %), and they would also inform their close relatives about what happened (22.5 %). 6.7 % of the answers show the uncertainty of the respondents in such cases, as they stated that they do not know how and where to report such an event (Figure 13).

3.4. Component IV - trust in the authorities

It included three main and two secondary questions. If the degree of involvement and trust in the authorities is low, the response of the population to the information and warnings issued by the authorities will be ignored and deemed unreliable. When the population is ignorant or does not trust the authorities, in the event of a weather-climate risk phenomenon, panic and disorder often result in material and human losses. This component of the questionnaire assessed the respondents' confidence in the involvement, organization capacity and equipment of local and central authorities for crisis management and in their monitoring of weather and climate patterns.

When surveyed, 60 % of the respondents considered that the authorities are involved or partially involved in the management of weather and climate risks, and 31 % believed that the authorities also monitor these risks. 67 % of the respondents further considered that the authorities are organized or partially organized to mitigate weather and climate risks, and 70 % considered that the authorities are equipped or partly equipped to effectively respond in the event of severe weather and climate phenomena.

Provided that their possessions were affected by a climate phenomenon, most of the respondents would rely on help received from family and relatives (43.3 %), acquaintances (12.9 %) and insurance companies (12.5 %), whereas 12.2 % considered that they would be mostly helped by the central and local authorities and 9.7 % by the central state authorities (Figure 14). The lower confidence rates in the aid provided by the authorities are due to the long time required for the authorities to conclude investigations and damage assessment, which most often results in the aid provided with a delay of a few weeks to months.

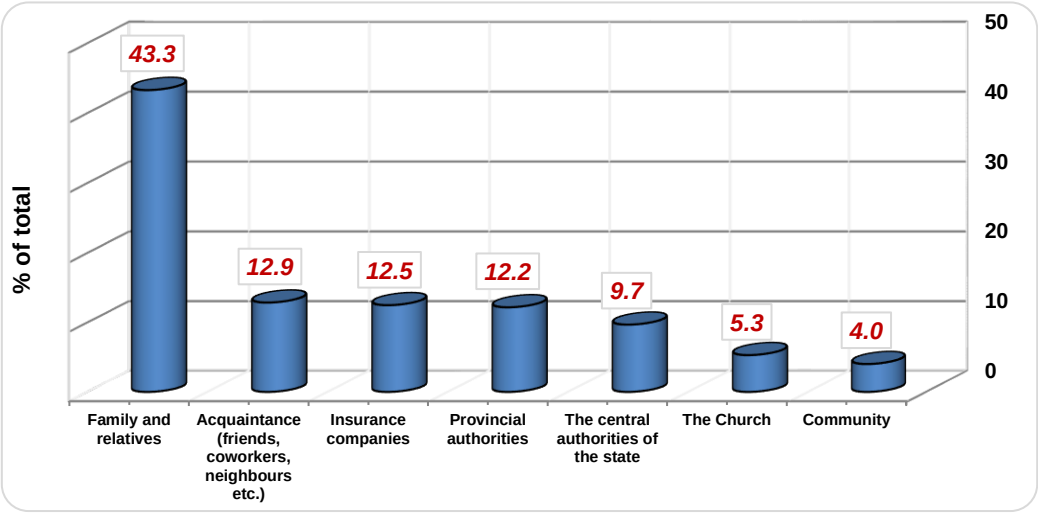


Figure 14. Percentage distribution (%) of the respondents on the 7 categories of answers proposed by the authors, based on the answer given to the question: *If you suffer damages as a result of a climate phenomenon, who do you think would provide the most important help? (First option = 2p; second option = 1p; points were converted into percentages of the total answers)*

The respondents were then asked to list 3 measures that the community and the authorities should take to mitigate the negative effects of dangerous weather - climate phenomena. 25 % of the respondents could not provide a specific answer and 75 % found various solutions (synthetically grouped by the authors in six categories): i) monitoring the environmental components in as many risk areas as possible, using modern tools; ii) a better equipment and professionalization of the decision and execution factors from the administration and deconcentrated institutions; iii) the availability of risk studies and action plans pre-event, synchronous to the event and post-event; iv) massive investments in infrastructure and environmental management; v) permanent education of the population on potential risks, informing and warning the population in due time,

and vi) streamlining the control structures and mechanisms responsible with monitoring compliance with environmental legislation and limiting human activities that negatively impact the environment.

3.5. Component V - availability for volunteering

It contained only one question. The willingness to participate in volunteer activities outlines the degree of solidarity, empathy or, on the contrary, the selfishness of the population.

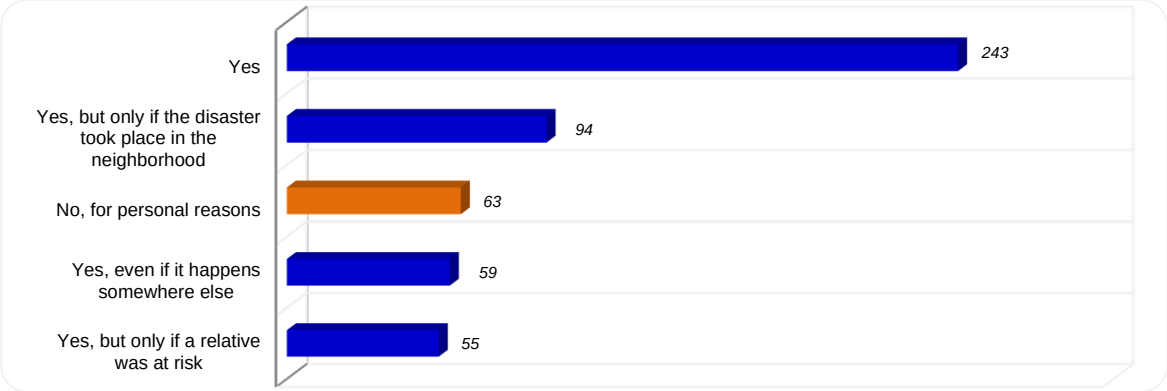


Figure 15. Numerical distribution of the respondents, on the 5 categories of answers proposed by the authors, based on the answers provided to the question: *Would you be willing to participate to volunteer actions (saving people / goods or rebuilding infrastructure etc.)?*

The answers show that the inhabitants of Suceava and the surrounding areas are generally willing to help, some of them unconditionally (21.5 %) while others only under certain conditions (65.8 %), whereas very few (12.7 %) would not participate at all to volunteer actions (Figure 15).

4. Discussion

Weather-climate risk perception studies are difficult to conduct and are therefore scarce. Based on these studies, a complex picture can be constructed of how the population of some communities relates to the surrounding climatic reality. Their results are complementary to scientific studies. The results of this study can be extended to a larger scale, such as that of the communities in the cities of Moldova and their surroundings. The present study showed the pros and cons of the level of readiness of the Suceava community in perceiving, intervening in and solving the problems raised by the occurrence of severe weather- climate phenomena. Authorities in Suceava and other cities can use this study to improve, together with the population, the management of pre-crisis, synchronous or post-crisis weather or climate-related risk situations. The results of our study are in agreement with the results of other studies (Cheval, 2003; Cheval and Dragne, 2004). With the material support of local, county and national administrations, these categories of studies should expand spatially and increase in complexity, providing answers to a wide range of questions, deficiencies and administrative unknowns.

5. Conclusions

The weather-climate phenomena that most of Suceava's residents fear are storms, associated with heavy and prolonged rain, torrential rain and hailstorm. Most of the respondents (75.5%) stated that they only sometimes panic in the event of weather and climate risk phenomena. The answers indicate good self-control and a correct assessment of the potential risk of severe weather events.

Respondents are familiar to an acceptable to good level with the weather and climate risk phenomena that generally occur in the neighborhoods and neighboring localities of Suceava and with how these events may affect them; however, when asked to rank these phenomena, their responses were inconsistent, based on the answers to similar items. These rankings have a high degree of subjectivity (limited by the multiple-choice items proposed by the authors), but broadly agree with the patterns of weather-climate characteristics quantitatively determined by specialists. Respondents are aware that negative weather events cause damages and endanger their health or life, but only 10.9% would insure their property and 20 % would buy life insurance. The majority of the assessed population takes the information on weather characteristics and forecasts from the Internet and the media and pays importance to the warnings issued by authorities, as they know the significance of the weather alert color codes. However, almost half of the respondents (48 %) could not propose at least two specific viable and implementable measures that should be taken in case of risk phenomena. At the community level, there is no proper organization for the management of weather-climate crises (which was acknowledged by 77 % of respondents). One positive thing is that the 112 emergency number is the main interface through which almost 60% of respondents would announce the occurrence of a dangerous weather-climate event.

Respondents' confidence in local and central authorities is high. 60% believe that the authorities are involved, 67 % believe that they are organized, and 70% believe that they are equipped or partially equipped to handle crisis situations. Provided that they suffered damages as a result of a weather or climate phenomenon, most of the respondents relied on the help received from family, relatives, acquaintances, friends, community (60.2 %) and less on the aid provided by insurance companies and authorities (34.5 %). This situation is worrying in a well-organized, structured, solidary and responsible country. 25 % of the respondents could not specify clear measures that the community and the authorities should take to mitigate the negative effects of dangerous weather-climate phenomena, and 75 % proposed very varied solutions, often confusing and difficult to implement in practice in the proposed form. There is a clear lack of experience of the population in the management of weather-climate crises. The willingness to participate in volunteer activities outlines the high degree of empathy of the population. Respondents were willing to help those in difficulty unconditionally (21.5 %) or only under certain conditions (65.8 %). Very few would refuse to participate in any volunteering activities.

This study can be used both scientifically and practically for administrative and policy-related purposes. Addressing the vulnerabilities of the administrative and social structures in relation to the meteorological-climate risks would increase the degree of resilience of the Suceava community to these risks, and would set the base for future sustainable measures.

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