
Knowledge and perception of natural hazards: results from population surveys to innovate risk communication

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Abstract

This paper shows results from a population survey carried out in South Tyrol (Italy) and in Carinthia (Austria) as part of the Interreg Italy-Austria Project “RiKoST-Risk communication strategies” that aims at improved, target-group-oriented risk communication. The aim of the survey is to assess people’s 1) state of knowledge about natural hazards, 2) risk perception 3) suggestions on how to improve risk communication. A better understanding and information about these aspects are crucial for risk communication activities. The data were collected in 13 municipalities in South Tyrol and Carinthia using questionnaires. Results show that there is a lack of knowledge about existing hazard maps and that respondents want to be better informed and more involved but that at the same time they delegate the responsibilities in risk management to institutions. Thanks to the close collaboration between researchers and practitioners the results of the survey will be implemented in practice for the development of new risk communication tools and the improvement of existing measures.

Introduction

In the Alps the management of the risks linked to natural hazards has a long tradition. In the last decades academia and public authorities invested substantial efforts in generating and improving knowledge about hazardous processes and in collecting and mapping data (Permanent Secretariat of the Alpine Convention, 2019). The results are sound models and detailed hazard maps that are crucial for risk management but that are not elaborated as a tool for risk communication. Hazard maps are preliminary an expert tool, but the content of these maps is of relevance and should be known and have an impact on people’s actions. In order to change people’s behavior, these maps have to be integrated in a complementary

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risk communication strategy and the content has to be tailored to different target groups' needs (Wenk et al., 2018, Hagemeyer-Klose & Wagner, 2009). The existing knowledge must be adapted and transmitted whilst ensuring that it is useful, usable and used by practitioners, policy makers and potentially affected people (Boaz and Hayden, 2002). The latter can, if they are well informed and willing to actively engage and undertake private precautionary measures, support and contribute to risk management. This clearly shows why risk communication plays a crucial role but at the same time it also raises questions for public authorities such as: how should an effective risk communication strategy look like in order to reach people and have an impact on their behaviour? how should messages be designed and what channels (e.g. radio, television, sms, internet, newspapers) should be used? What do people know about natural hazards and how do they perceive risks? All this information is crucial for local authorities to be able to design and implement innovative risk communication tools, that can follow different goals such as information exchange but also awareness building or legitimisation of decision making (Renn, 1992; Höppner et al., 2012). Nowadays risk communication often occurs unidirectional without the interaction of institutions, stakeholders and the population. The lack of innovative and adaptive communication strategies means that technical knowledge is not communicated in a way that reaches and can be understood by a non-expert audience. Whether or not risk communication is successful is also strongly connected to people's risk perception. Risk perception is multifaceted and complex as several concepts show (Maidl & Buchecker 2015, Kellens et al. 2013) and is influenced by factors such knowledge, experience, values, attitudes, and emotions (Wachinger et al., 2013) as well as cultural determinants (Macgill, 1989). The use of questionnaires is a valid method to assess people's risk perception and the generated results can give important inputs for risk communication.

This contribution shows results from the Interreg Italy-Austria Project "RiKoST - Risk communication strategies". The project is a collaboration between partners from research and public authorities and aims at improved, target-group-oriented risk communication in South Tyrol (Italy) and Carinthia (Austria). One of the project's work packages carried out a population survey on knowledge about natural hazards and risk perception in selected municipalities in South Tyrol and in Carinthia. The reason behind is that knowing what people think about natural hazards, what structural and non-structural measures they know and how they perceive risks linked to natural hazards is considered an important starting point for the development of new and the improvement of existing risk communication tools and activities. The aim of the survey is to collect data about people's 1) state of knowledge about natural hazards, 2) risk perception 3) suggestions for the improvement of risk communication. Previous studies have shown that living in an area of risk does not automatically mean to be prepared (Pedoth et al., 2018). The collected data should give a better understanding about the relationship between knowledge, perception and preparedness and about the influencing factors of these three aspects. In South Tyrol, the Agency for civil protection uses the results of the survey as input for the development of a new online platform about natural hazards. In Carinthia, the results are used to adapt the communication within the process of hazard mapping and the elaboration of contingency plans.

Methods

We selected 13 municipalities (8 in South Tyrol and 5 in Carinthia) for the population survey. In South Tyrol, the criteria for the selection of the pilot municipalities were 1) the size of the municipalities (small rural municipalities and urban municipality) 2) natural hazard events (municipalities that recently experienced a natural hazard event and municipalities that did not) and 3) the existence of natural hazard maps. This last criterion was selected because in South Tyrol natural hazard maps are a recently introduced legal binding planning instrument developed at municipality level. At this stage, about half of the municipalities have an approved hazard map. By selecting four municipalities that have an approved hazard map and four without we wanted to investigate if the introduction of such a plan has an impact on the knowledge, the risk perception, the feeling of safety and the actions and behavior of the population. In Carinthia, we selected municipalities with bilingual (Slovenian speaking) population that recently experienced flood events and where therefore exists a need and interest in improving existing risk communication activities and tools. We performed an extensive literature review about the state of the art of research in the field of risk communication and risk perception, about most important underlying theories and conceptual frameworks and about existing good practices. Based on the results of this review we developed a questionnaire to assess and better understand people's knowledge, perception and behavior linked to risks from natural hazards, including information about most used communication channels and perceived responsibilities in risk management. The questionnaire contains a total number of 42 questions of different types (e.g. multiple answers, Likert scale, open question) and is divided in four sections: 1) Knowledge about natural hazards, 2) Risk perception, 3) Responsibilities in risk management including the role of citizens and 4) suggestions on how to improve existing risk management activities with a focus on risk communication. For each respondent we collected also socio-demographic data such as age, gender, education, profession, length of residency, owner or tenant. The data were collected between June and August 2019. We used the same questionnaire in South Tyrol and in Carinthia, but the data collection method differed. In South Tyrol the data were collected through Computer Assisted Telephone Interviews (CATI) and Computer Assisted Personal Interviews (CAPI) of about 20 minutes in order to obtain a representative sample of full age residents. In Carinthia 8234 questionnaires were sent via post mail as an official communication from the regional government to all registered addresses in the municipalities. Due to the different data collection method, only data from South Tyrol can be considered representative. A total of 2292 answers to the questionnaire were collected, 1410 in South Tyrol and 882 in Carinthia (nearly 11% return rate). Subsequently, the data were analysed separately for the two regions using SPSS software (SPSS Inc., 2017). Descriptive statistics such as frequencies for categorical variables and mean values for Likert scale variables were calculated in order to explore the profile of the sample and the main emerging results related to knowledge about natural hazards and risk perception. As in South Tyrol only half of municipalities has a natural hazard map, we wanted to understand if the knowledge declared by the respondents (either "yes, my municipality has a natural hazard map;" or "no, my municipality do not have a natural hazard map;" or "I do not know") is in line with the real situation. By combining the knowledge about the natural hazard map with the municipality

of respondents, three groups were individuated for which frequencies distribution, an average risk perception and feeling of safety were calculated. Subsequently we identified the 5 most preferred information channels chosen by the three groups. The results are presented in the next section and in Figure 1.

Results and discussion

In South Tyrol the respondents are 51,3% women and 48,7% men and show a well-balanced and veridic distribution for the different age classes (18-29; 30-39; 40-49; 50-59; 60-69; 70+) with respect to the current age and gender distribution in the municipalities. In terms of education the collected data cover different graduation grades (from elementary school degree to doctorate). Most of the respondents (74,3%) own their house or apartment they live in, 15,5% are tenants and 10,2% are non-commercial tenants. Previous studies showed that an important factor, which influences risk perception, is the perceived probability of being affected by a natural hazard event. Our data show that in South Tyrol the mean perceived probability that the municipality people live in will be affected by a natural hazard event in the upcoming 5 years is 37,8%. The probability that their house will be affected in the upcoming 5 years is perceived as much lower with a mean probability of 25,9%. In Carinthia the mean perceived probability for the municipality being affected in the upcoming 5 years is 62,7% whilst for the own house it is 46,7%. In both regions, respondents think that it is less probable that their house will be affected but in Carinthia both values are much higher than in South Tyrol. One reason for this difference is the fact that in Carinthia all municipalities recently experienced natural hazard events. In December 2017 and November 2018 foehn wind events with storm and flood damages hit the south eastern part of Carinthia and the degree of direct or at least indirect affection was very high.

Two other important aspects resulting from our study tackle the question if people think that the existing structural and non-structural measures are enough to protect the population from natural hazards and what people think about responsibilities in natural hazard management. In South Tyrol 80,4% of respondents stated that the existing measures are sufficient and mentioned the following reasons: 1) natural hazards are well-monitored; 2) there are enough structural protection measures in place in the municipality are and 3) the institutions and the civil protection organizations are well-coordinated and qualified. 8,3% of respondents stated that the existing measures are not sufficient. The main reasons are 1) more structural protection measures are necessary; 2) natural hazards should be better monitored and 3) the citizens are not sufficiently informed and involved. 11,3% stated that they do not know. We also asked respondents to indicate three actors responsible for risk management from a given list of different actors (including institutions, organisations and the themselves as citizens).

Our data show that in South Tyrol respondents think that the Province, the municipality and organisations (such as the voluntary fire brigade) are responsible for risk prevention. When looking at the response and recovery phase the responsible actors are the Province, the national state and the municipality. For prevention as well as for response and recovery, the most important actor is the Province. Respondents clearly think that risk management is the role of institutions (59,4%). One third of respondents (32,9%) states that citizens have

an important role and should be more actively involved. In Carinthia the percentage of respondents that think that the existing measures are sufficient is lower (37,7%) but the 3 main reasons are the same than in South Tyrol. Compared to South Tyrol more respondents said that the measures are not enough (23,6%) but the reasons mentioned are similar to South Tyrol with the difference that respondents in Carinthia mentioned the lack of money as one the three most important reasons. In Carinthia respondents think that the three main actors for the prevention of and the response to natural hazard events are the federal province of Carinthia, the national state and the municipality and that for both phases (prevention and response) the municipality has the most important role. Here we see a difference between the results from the two regions that reflects well the differences in the legal and organisational setting in the field of risk management (in South Tyrol the Province plays a key role for prevention and protection whilst in Carinthia the most important actor in this field is the municipality). In Carinthia, a higher percentage of persons (49,2%) think that citizens should be more involved and should have an active role in risk management and compared to South Tyrol, less respondents (38%) delegate this task to the institutions. Our interpretation is that people who experienced storm events do not expect that institutions could set preventive measures against storms. They feel that it is more helpful to receive information how to get prepared and what action they could undertake as individuals (e.g. buying an electric generator or laying in food storage).

In terms of knowledge about natural hazards as well as for the awareness and preparedness of the population, natural hazard maps are a key instrument and can, if adapted to a non-expert public, play an important role for risk communication (Wenk et al, 2018). Although in Carinthia there is a complete coverage with hazard maps, only 27 % of the respondents know that there are hazard maps available for their municipality. 60 % do not know about hazard maps. In South Tyrol 63,7% state that there is a hazard map for their municipality, 6,5% say there is no hazard map and 29,9% do not know. Considering that actually only half of the South Tyrolean municipality have a hazard map we performed some more detailed analysis combining the knowledge about the natural hazard map with the municipality of residency. Based on the data from South Tyrol we discovered three groups that we divided according to their knowledge about hazard maps (Figure 1). The first group, respondents that have “true” knowledge (47,1%), are persons who say that they know the hazard map and live in municipalities that have approved hazard maps or persons that say that there is no hazard map in municipalities which actually do not have an approved hazard map. The second group are persons that have “false” knowledge (18,6%) because they say that they know the hazard map of their municipality, but they live in municipalities that do not have an approved hazard map. The third group (34,2%) are persons that don’t know if their municipality has a hazard map or persons that say that there is no map in municipalities that have an approved hazard map.

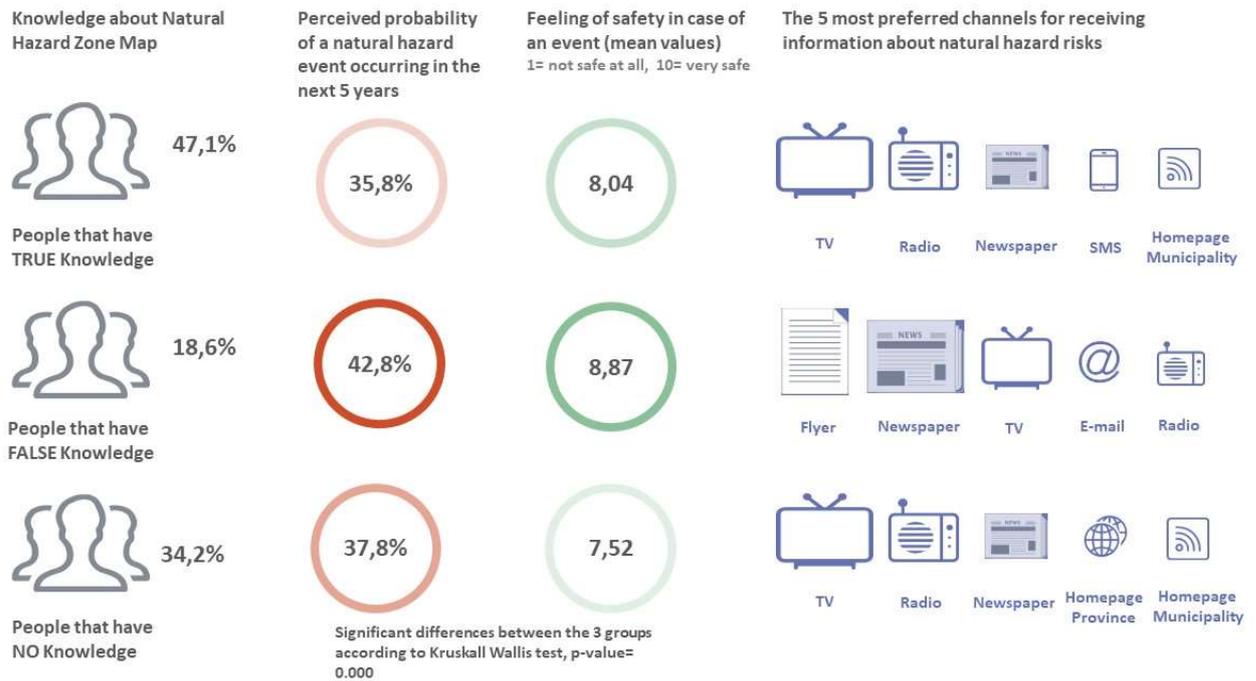


Figure 1: The figure shows three population groups (individuated by combining respondents' knowledge about natural hazard maps and their municipality of residence) and the risk perception, the feeling of safety and the preferred information channels for each group. The figure is based on data collected in 8 municipalities in South Tyrol.

Figure 1 shows that the second group, respondents that have false knowledge, perceive the probability of a natural hazard event happening higher compared to the other two groups. At the same time, they feel safer in case of an event happening. Also, in terms of the 5 most preferred information channels for risk communication this group has different preferences. The preferred channel for risk communication for that group is a flyer or information brochure whilst the other two groups choose the television as preferred information channel for risk communication. In terms of risk communication this raises the question why people belonging to this group think to know the hazard map even though it do not exist and how they could be reached and informed about the actual status of hazard mapping in their municipality. As next steps we will discuss these questions together with representatives from the municipalities in order to find possible reasons for this non accurate knowledge. One reason could be that people confound the hazard map with other instruments such as the civil protection plan. Results from the open question about what type of information people would like to receive show, that people ask for more and better information on how they could contribute to the prevention of natural hazard risks, what actions they could undertake and how to best behave before and during natural hazard events. The answers also show that people would like to receive information about natural hazards and related risks not only at the municipality level but also at the level of neighborhood or district.

Conclusions

Results show that respondents would like to be better informed and receive clear information on what concrete measures they could undertake, in which way they could contribute and how they should behave in case of an event happening. At the same time, respondents tend to delegate the responsibility to institutions. Future work should address the question if more involvement of citizens should also result in more responsibility for example in terms of private precautionary actions.

The aim of the population survey was to generate results that could be used by public authorities to improve risk communication and support the development of new risk communication tools. For Carinthia, part of the replies was nearly as expected, for example that responses came mainly from people directly affected, but some were surprising. We did not expect for example that less than 30% of the respondents know about hazard maps in their municipality and that traditional communication channels such as TV, radio and newspaper are still so important. A surprising and positive result was that nearly 50% of the respondents would like to have a more active role within risk prevention and would like to be better informed about what actions they could undertake. These results show that future risk communication activities in Carinthia should focus on 1) a better information on hazard maps and which consequences they have, 2) individual prevention and protection measures and 3) communication activities that directly address affected people (in addition to communication activities for the whole community) . The regional government of Carinthia will use the results for working out natural hazard contingency plans. Within this process stakeholders as well as the affected population are invited to actively contribute and give input. In this way, the elaboration of such contingency plans can act as opportunity for bringing together different stakeholders and represent a platform for risk communication. In South Tyrol the agency for civil protection is working on the development of a new online platform for different type of information related to natural hazards and will use the results from the survey as input in order to create a tool for risk communication that is tailored to different user groups.

In terms of use and impact of results, this project has an added value because all activities have been developed and carried out together with partners from public authorities. This allows to integrate their knowledge and experiences, for example for the survey design and the development of questionnaires, and gives the opportunity to use the results of population surveys not only for advancing knowledge in terms of risk perception but also for implementing them in practice by supporting the development of new tools and the improvement of existing measures.

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