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Applying risk governance principles to natural hazards and risks in mountains

Doctoral dissertation
For the academic degree of Doctor of Political Science (Dr. rer. pol.)
Of Faculty of Spatial Planning of Technical University of Dortmund

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June 2011

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Acknowledgements

I would like to express my infinite gratitude to Prof. Stefan Greiving for his guidance and comments during this work. His indefectible trust and support helped me go through the hard times a PhD student can expect to face. I am very proud of being one of his *padawan*.

I thank Prof. Susanne Frank and Prof. Kalliopi Sapountzaki who accepted to judge this work. Their insights on the topics I addressed were precious.

I thank all the Mountain Risks network members, especially my fellow “ESR & ER” for the great atmosphere of collaborative work. I am particularly thankful to Carolina Garcia and Melanie Kappes for the work we conducted together on our respective case studies.

I thank Dr. Sylvia Wanczura, Dr. Ebru Alarslan and Dr. Graciela Peters-Guarin for showing me what it will be like “in the end, and after”, and for the nice time spent in Dortmund. I also thank my colleagues at IRPUD.

I address a particularly grateful thank to Olivier for his coaching and support in the final stage of this work. I would not have finished it without his help.

Last but not least, I would like to hug my sisters, Cyrielle and Maëlys, whose constant presence by my side, even if we live in different countries, has always been a considerable support, and my mother, Evelyne, for believing in me, especially when I did not, and always supporting me in every crazy and stupid decision I make.

Merci

Abstract

The multidisciplinarity of spatial planning leads it to address all spatially relevant issues present on a territory. Among them, the question of natural hazards and risks gained a particular attention in the last decades.

Despite the permanent deepening of knowledge about natural hazards and risks, and the various strategies adopted to reduce their impact on societies, natural disasters are still causing considerable damages and taking lives. Obviously, the traditional approaches have reached their limit. The new challenges posed by natural risks create a need for a more comprehensive approach, risk governance.

This framework includes risk assessment and risk management, embedded in a large risk communication environment. The place of the public in this approach has to be shifted from potential victims to active actors in the decision making processes.

In addition, the general dynamic of harmonisation of policies observed in the European Union conducts to consider an harmonisation of natural risks related policies. Moreover, as many regions in Europe are facing similar risks with different strategies influenced by their respective risk cultures, sharing methods and knowledge could help reaching a higher efficiency. But the transfer of methods is hindered by the dissimilarities in risk cultures.

This study addresses the perceptions and expectations of the public in risk prone areas, in an attempt to understand how far they influence risk cultures. By comparing perceptions and expectations in two sites with similar risk settings, the study aimed at pointing out the elements that shape risk cultures, and understand how they could be considered when transferring good practice examples.

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List of acronyms

AESOP Association of European Schools of Planning
CCVU Communauté de Communes de la Vallée de l'Ubaye
CMT Comunità Montana Valtellina di Tirano
DATAR Délégation interministérielle à l'Aménagement du Territoire et à l'Attractivité Régionale
ESDP European Saptial Development Perspective
ESPON European Spatial Planning Observatory Network
IRGC International Risk Governance Council
IRSN Institut de Radioprotection et de Sûreté Nucléaire (France)
NOAA National Oceanic and Atmospheric Adminsitration (USA)
RTM Resturation des Terrains de Montagne (France)
TORRO Tornadoes and Storms Research Organisation (UK)
UN/ISDR United Nations International Strategy for Disaster Reduction

Gouverner, c’est choisir.

Pierre Mendès France

1. Preliminary considerations: risk terminology and risk governance framework

Spatial planning can be defined as "the whole comprehensive, co-ordinating spatially oriented planning at all scales (national – local)"[1]. In this frame, it is expected to “make decisions for society regarding if and how certain spaces will be used"[2]. In order to do so, spatial planners have to take into account all the relevant parameters that characterise a given territory, whether they are environmental, social or economical. It is necessary to understand the threats that weigh on a space to avoid jeopardising its safety, and the safety of its users.

Besides the obvious spatial component of their work, planners need to inscribe their action in time and try as much as feasible to propose sustainable options that will simultaneously offer lasting safety but not preclude further development.

This is where the multidisciplinary aspect of spatial planning shows its significance. Spatial planners have to integrate the work of several domains into their thinking. In addition to the data they collect and analyse themselves, they must make use of the expertise of other domains (such as geosciences, engineering, or social sciences). Territorial development is complex, it is necessary to gather all relevant information about a given territory independently of the science it comes form.

Among the topics planners have to address, one gained a particular attention in the last decades: natural hazards and risks.

Most natural hazards carry a spatial component: they threaten a specific territory. As such, they present a certain interest for sectoral planners[3], and they are elements to be taken into account in spatial development plans. Moreover, spatial planning can serve as a tool to reduce the impact of natural hazards to human societies.

The importance of addressing the question of natural hazards in spatial planning is recognised by authorities. At a transnational level, the European Union and the European Commission have acknowledged it in several statements:

1 Fleischhauer, Greiving, Wanczura 2006

2 Greiving, Fleischhauer 2006

3 Fleischhauer 2006b

> Spatial planning at suitable government and administrative levels can play a decisive role, as well as in the protection of humans and resources against natural disasters.(ESDP)[4]

> III Territorial priorities for the development of the European Union
>
> 5. We promote trans-European risk management including the impacts of climate change.
>
> Joint transregional and integrated approaches and strategies should be further developed in order to face natural hazards, reduce and mitigate greenhouse gas emissions and adapt to climate change. Further work is required to develop and intensify territorial cohesion policy, particularly with respect to the consequences of territorially differentiated adaptation strategies.
>
> (Territorial agenda)

The directive on assessment and management of flood risks[5] states common objectives to be reached by all member states, with important milestones: preliminary flood risk assessment by 22/12/2011, hazard maps and risk maps by 22/12/2013, flood risk management plans by 22/12/2015, a first review and update by 22/12/2018 and every 6 years thereafter.

The problematic of natural hazards and risks is also studied in various disciplines, focusing on one hazard or considering them all, usually addressing one phase of the governance cycle. The scientific knowledge about natural phenomena and processes is deepening day after day, and techniques for protecting societies from risk are improving.

Nevertheless, after decades of work, research, policies and measures, natural hazards and risks still cause considerable damages. This paradox can be summarised by a simple sentence: "both estimated losses from natural hazards and understanding about them have increased during the

4 European Commission 1999

5 Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks

past decade"[6]. Catastrophic events such as the heat wave of 2003, the l'Aquila earthquake, floods in eastern Germany remind us painfully that this threat is still upon us.

It seems that the traditional methods have reached their limits. In addition, societies show a growing interest in risk "because they are questioning their choices in a perspective of sustainable development"[7]. Risks are not tolerated anymore. The social pressure for total safety is huge. People are asking for a "risk zero" society. This is particularly true regarding natural hazards and risks. Nobody is willing to accept the consequences of natural disasters. Paradoxically, in societies where environmental concerns are growing, the tolerance towards natural processes is very low. In this context, authorities from local to supranational levels work on reducing risks. Although they can lessen the vulnerability of communities or lower the impact of hazards, they cannot eradicate the risk.

Human societies are facing new challenges. In particular concerning natural hazards, the documented "decline in trust [in] policy makers"[8] and the issue of climate change render the traditional approach obsolete. It is no more acceptable to let the society out of the decision making process, and no more sufficient to base decisions on past events. The increasing uncertainty calls for a more comprehensive and integrative approach.

This is offered by the risk governance framework, encompassing not only risk assessment and risk management in their classic meaning, but also risk communication, and involving the society in the decision making process.

This study will address the question of application of governance principles to assessment and management of natural hazards and risks, with a particular focus on the place of the public. More specifically, the question of transfer of methods and best practice examples between risk settings will be considered.

Before going further into details, it is necessary to consider the terminology and to present the risk governance framework.

6 White, Kates, Burton 2001

7 Rougier 2004, originally in French

8 Löfstedt 2009

1. 1. Terminology

Natural hazards (in the strict meaning of hazards, see chapter 1.1.1) are studied in various disciplines, in the frame of geosciences (geomorphology, geology, hydrology, seismology). Very sharp sciences have developed around these hazards, studying deeply one type of phenomenon (e.g. seismology). Some scientists have become experts about a specific hazard in a specific context. Thus, different communities of scientists working on the natural hazards co-exist, some of them considering the whole range of processes, some limiting to a category (for instance, hydrological hazards), some focusing on a single hazard, and among them, some restrict their studies to a specific geographical frame (for example, the Alps) while others consider a wider scale, or just treat the processes as objects independent from their situation on the globe.

When shifting from hazard to risk assessment, other sciences get involved. The evaluation of vulnerability requires inter alia the participation of experts in civil engineering (assessing the extent of damages), economy (assessing the cost of damages), or psychology (understanding the perception of risks). Risk management also brings about its own experts.

As a result of this large multi-disciplinary character of the risk topic, "many fields have cultivated their own understanding and, hence, their own definitions of disaster-related terms"[9]. Among a field or science different schools and streams can also use different definitions of terms. In spatial planning, sectoral planners and comprehensive planners have different needs in terminology: sectoral planning needs more precise and detailed vocabulary, when comprehensive planning needs to address easily several issues.

It is obvious that "in order to be efficient, scientific observation supposes the existence of a sharp vocabulary"[10]. As stated by Veyret when dealing with risks, "the terminology used is very heterogeneous, which constitutes a hindrance to the development of a knowledge of risk across European countries"[11]. The terms used vary according to the language and the disciplines.

Although the terminology seems unified, the different communities put different understanding behind the same term. Dauphiné explains this very well: "A same term can have several meanings, and it is often used to describe different facts." [12] This causes no problem as long as the difference is acknowledged, but the increasing place of multidisciplinarity leads to situations where "the same

9 Thywissen 2006a

10 Dauphiné 2003, originally in French

11 Veyret, Garry, Meschinet de Richemond 2004, originally in French

12 Dauphiné 2003, originally in French

term is being defined in different ways"[13] . Because of this, "communication within the disaster reduction community is often encumbered and misunderstandings are common"[14]. It becomes necessary to clarify these differences at the very beginning of a collaboration. As Dauphiné concludes, "polysemy of words cannot disappear entirely but it is necessary to reduce it in order to improve scientific communication"[15].

The idea of a unified glossary of risk related terms remains utopian. Although it would ease collaboration between actors from different backgrounds, it is not achievable. In every field addressing risks, the terms chosen and the meaning they carry has evolved through time and is fitting to specific needs and activities. The definitions "are valid in their respective contexts"[16] and reflect adhesion to a theory of risk.

This can be illustrated by the evolution of epistemological interpretation of natural hazards and risks. According to Pelling[17] , interpretation went through three phases: a first phase where studies concentrated on hazards (until the 1970s), a second phase with a growing interest in the role of humans in disasters (until the 1990s), and a third phase where the relation between risks and society led to an integrative vision (still enforce). Through these phases, the vocabulary evolved to suit the changing paradigms. The meanings of essential terms such as "hazard" or "risk" have changed, and new words appeared in the discourse to accompany the emergence of new concepts (e.g. "resilience" or "vulnerability").

Thywissen describes this problem as a "Babelonian confusion", refering to the Babel Tower and its builders who could not understand each other.

The misunderstandings caused by the existence of this "Babelonian confusion" can hinder communication between sciences fields, and between science and society.

As this study is positioned at the crossroads of different fields, and relies on data and information gathered from various sources, it seems important to shortly present the key terms and their different meanings.

13 Thywissen 2006a

14 ibid.

15 Dauphiné 2003, originally in French

16 Thywissen 2006a

17 Pelling 2003

1. 1. 1. Hazard

The first element leading to a situation of risk is the existence of a hazard. A hazard is the potential occurrence of an event or phenomenon that is expected to cause damages. Hazard refers to the potentially harmful situation, but not to its realisation, which is called event, or according to its seriousness, disaster or catastrophe.

Basically, the word hazard is borrowed to the vocabulary of probabilities and means "the probability of occurrence of a phenomenon" [18]. In the context of risk-related disciplines, it can be used in this same acceptance (it is the case for instance in geosciences). For Dauphiné[19] a hazard is "defined by a probability that takes into account two characteristics, the occurrence and the intensity of the considered phenomenon".
In a wider sense, a hazard can be seen as a possibly occurring phenomenon. The latter meaning is especially used by the United Nations International Strategy for Disaster Reduction (UN/ISDR) in their report of 2004[20]:

> "A hazard is a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydrometeorological and biological) or induced by human processes (environmental degradation and technological hazards)."

This definition encompasses all possible risk situations. As mentioned, hazards can be classified according to their origin, natural or human-induced. Each category comprises a large range of phenomena and events. Landslides, epidemics, extreme temperatures are some examples of natural hazards, whereas industry, transports and deforestation are examples of man-induced hazards.

It is important to note that a hazard is not negative in itself. Although it creates the potential for a danger, it only becomes an actual risk when interacting with humans, society or stakes.

18 Dauphiné 2003 , originally in French

19 Ibid.

20 UN/ISDR 2004

For this study, the term hazard will be used as defined in the UN/ISDR definition.

The second component of risk is the expected consequences of the hazard.

1. 1. 2. Vulnerability

The second part of the definition of risk is related to the consequences of the realisation of the hazard into an actual event. It reflects an "intrinsic feature of the affected community"[21]. Again, many disciplines are dealing with risk, and the definitions used in each of them are specifically fitted to their frame. Nevertheless, there are two main approaches to this part of the equation. Although they are both named vulnerability, they actually refer to dissimilar conceptions.

The first approach considers the extent of expected damages. It can alternatively be named elements at risk or damage potential, and is mainly used in contexts presenting a "practical" vision of risk such as geosciences or engineering. This "analytical definition refers to the level of predictable consequences of a natural phenomenon on stakes"[22]. It allows a quantitative vision of the hazard, for instance the percentage of damaged buildings or the cost of reconstruction, but it does not permit to take into account important elements such as non-structural vulnerabilities (e.g. cultural, institutional, see chapter 1.2.2).

The second approach refers to the susceptibility of a system (community, environment) to suffer damages caused by an event. It is mostly used in abstractive contexts but is more and more considered as a wider understanding of the "damage" element of risk.

In the context of risk, vulnerability can be approached in two ways: one could be described as pessimistic, the other as optimistic, as in a "glass half empty / glass half full" dichotomy.

The pessimistic understanding of vulnerability is similar to the common definition of the word itself. Vulnerability is a susceptibility to suffer damages or to be harmed. For Birkmann[23] vulnerability "is defined as a condition resulting from physical, social, economic and environmental factors or processes that increase the susceptibility of a community to the impact of a hazard".

The optimistic vision is derived from the concept of resilience. Instead of considering how bad the impact of hazard could be, this approach focuses on how good the response can be. Vulnerability

21 Thywissen, 2006b

22 Dauphiné 2003, originally in French

23 Birkmann, 2006a

is here considered as the opposite of resilience[24] and coping capacities[25]: "The more a system is able to bounce back after a disaster, the less it is vulnerable"[26].
This shift in paradigm leads to a larger understanding of resilience as "the linkage between sustainable development and hazard mitigation"[27].

For this study, vulnerability will be understood in its larger meaning, as a susceptibility to suffer damages or to be harmed, which can be lowered by coping and resilience capacities.

Now that the foundations are settled, the definition of risk can be approached.

1. 1. 3. Risk

As above mentioned, risk is "a composite notion, product of a hazard and a vulnerability"[28]. How are they articulated together?

Again, it all depends on the context. The general acceptance is summarised in a simple equation:

Risk = Hazard x Vulnerability

The multiplication here can be understood either as a mathematical operation or as a relation of combination of hazard and vulnerability. When using this definition literally, a problem arises: the risks resulting from a high hazard and a low vulnerability are not differentiated from the risks resulting from a low hazard and a high vulnerability. Dauphiné[29] illustrates this by the following equation:

$$9 \times 4 = 6 \times 6 = 4 \times 9$$

In order to avoid this, the formula can be completed or specified. For instance, it can be presented as a function:

---

24 Resilience is the capacity to bounce back to normal functioning after a disrupting event

25 Coping capacity: "The means by which people or organisations use available resources and abilities to face adverse consequences that could lead to a disaster. In general, this involves managing resources, both in normal times as well as during crisis or adverse conditions. The strengthening of coping capacities usually build resilience to withstand the effects of natural and human induced hazards.", definition of UN/ISDR, 2004

26 Dauphiné 2003, originally in French

27 Berke, Smith 2009

28 Dauphiné 2003, originally in French

29 Ibid.

Risk = f (Hazard, Vulnerability)

Some authors include other components in the equation, like in the definition proposed by Thywissen[30]:

Risk = f (Hazard, Vulnerability, Exposure, Resilience)

where exposure and resilience are not considered as elements of vulnerabilities. Thouret & Leone[31] identify four parameters in risk: hazard, vulnerable society, potential damages and response capacity of the society. They also insist on the versatility in time and space of these parameters, causing the risk to be in constant evolution.

Fleischhauer[32] suggests the following vision of risk:

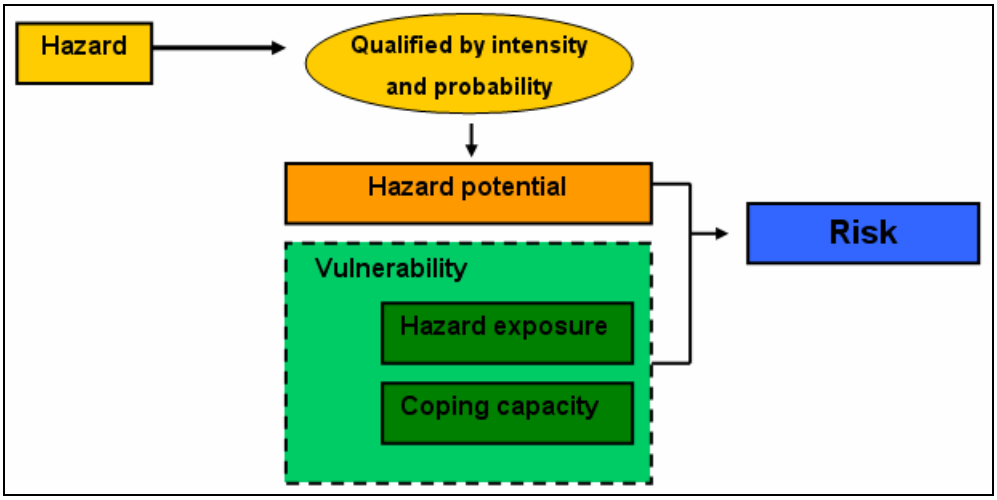


Figure 1. Components of risk Source: Fleischhauer 2004

Hazard exposure and coping capacity are here considered as integrant parts of vulnerability.

Risk carries two essential aspects. First, it always involves an interaction between human societies and their natural environment. Humans can be either at the source of the hazard (as the element causing the risk) or affected by the impact of the hazard (as the threatened element). A natural phenomenon that would have consequences only on the natural environment and not affect human societies in any way is not considered as a risk. For instance, a potential landslide in an

30 Thywissen 2006a

31 Thouret, Leone 2003, originally in French

32 Fleischhauer 2004

uninhabited region is a natural phenomenon, but not a risk. Secondly, risk is "fundamentally real and unreal at the same time"[33]. A risk is the existence of a potential danger.

There are different types of risk, usually defined by the type of hazard they are resulting from: natural (e.g. floods), technological (e.g. risk linked to the transport of chemical products), financial (e.g. state bankrupt), social (e.g. riots)…

The realisation of a risk into an actual event is called an event or, depending on its extent, a disaster or a catastrophe.

As explained earlier in this study (see chapter 1.1) there are different logics under the definition used, according to the domain and its needs (more or less quantitative, more or less precise and numbered). The only element shared by all the definitions and understandings is the negative aspect of risk. The realisation of a risk into an actual event is expected to cause negative effects.
In this study, risk will be understood as the interaction of a hazard and vulnerabilities (with exposure and coping capacity being elements of vulnerability) and not necessarily quantifiable.

1. 1. 4. Natural risks

Natural hazards cover all the natural phenomena that can interact with human societies and cause damages. They are usually classified according to the type of phenomenon they involve. Dauphiné proposes a rather comprehensive categorisation[34]:

- Lithospheric phenomena (volcanic eruptions, earthquakes, landslides, avalanches)
- Atmospheric phenomena (storms, tornados, frost)
- Hydrological phenomena (floods, droughts, expansive clays)
- Phenomena involving the biosphere (forest fires)

Another categorisation is used, only distinguishing between meteorological and geomorphological hazards. In this typology, forest fires are left aside, considered as a human-induced phenomenon.

As seen before, the interaction of a hazard and vulnerabilities creates a risk. It could be expected that the interaction of natural hazards and vulnerabilities creates natural risks.

33 Beck 2008

34 Dauphiné 2003, originally in French

The expression natural risk is not often employed in literature. Perhaps this is due to its ambiguity: it is not clear if the risk results from nature or affects nature. Therefore, two expressions are used to be more specific. Environmental risks are those affecting the nature, and resulting from human activity. Natural hazards are the risks resulting from… natural hazards. This poses some problems. The distinction between hazard and risk is blurred.

Probably, this can be explained by the fact that it is not the phenomena themselves that raised the interest of people, but their interaction with human societies. It is easy to consider hazard and risk separately in other contexts, where they both have a human component. For instance, a car can represent a hazard, but not a risk in itself, whereas a car accident is a risk, resulting from the use of a car. With natural phenomena the limit is not as clear: a landslide is both a hazard and a risk, only the existence of vulnerability makes the difference.

Another possible explanation lies in the dominant position of "hard sciences" (hydrology, geomorphology …) in natural hazards and risks studies. As these fields focus on natural phenomenon and processes and rarely address the human and societal component of risk, they might tend to use the term hazard independently from the existence of a vulnerability. As seen in the considerations about terminology (see chapter 1.1) this understanding makes sense in the context where it is in use, but is not satisfactory for every risk related work.

This confusion between natural risk and natural hazard is existing in some languages spoken in Europe, such as German (both are named *Naturgefahren*), or Swiss French (*danger naturel*). Contrariwise, in other languages the differentiation is clearer. In French the phenomenon is named *aléa naturel* and the resulting risk *risque naturel*, and in Italian the *rischio* is caused by the *pericolosità*. A deeper analyse of risk-related terminology in different languages could perhaps explain this apparent cleavage between Romance languages and Germanic languages.

For this study, in order to distinguish the natural phenomenon and the resulting risks, the term "natural risks" will refer to the risks resulting from natural hazards.

1. 2. Dealing with natural risks

Modern societies are subject to many risks, but are less and less tolerating them. For centuries, risks were considered with fatality: there was no escape to those disasters and catastrophes. It was part of life. As long as those events have been regarded as the manifestation of the wills of gods, there was little to do to avoid them. Nowadays, the understanding of risk is different. The mechanisms behind disasters are known better. Veyret states that "the social concern about

natural risks is increasing and leads to national debates"[35]. There is a huge social pressure on authorities to reduce or even erase risks, and repair the damages they can cause. "Because of the socio-economic functioning of Western societies and the underlying social constraints"[36], the claim for safety has grown. Although it is not achievable, society asks for a total security, symbolised by the "risk zero" concept: no risk, complete safety.

Western societies "constantly forge new risk. Learning to manage them, which means knowing them, preventing them, protecting from them or limiting their effects when they happen, is one of the major challenges that they have to face"[37]. In addition, the influence of media tends to encourage "collective fears […] sometimes justified, but with exaggerated consequences"[38] Risks are omnipresent in modern societies, and dealing with them is now an obligation. They cannot be ignored. A range of tools has been developed and used to reduce the impact of risks, or avoid their realisation into actual events.
Traditionally, risk management was composed of actions reducing a hazard (mainly structural) and measures taken to reduce vulnerability (either structural, e.g. on buildings, or non structural, e.g. land use planning). This traditional approach, which has been used for centuries[39], does not fit anymore to the risks modern societies are facing. Today's risks are complex, uncertain and ambiguous (see chapter 2.3). "Approaches in disaster reduction have become much more complex and emphasis has shifted from relief to mitigation"[40]. "Risk handling is not just about risk management"[41]. To answer to these new needs, a larger and more inclusive approach has emerged: the risk governance frame.

In this chapter, after presenting governance and risk governance and how it is applied to natural risks, the different elements of the risk governance framework will be investigated successively.

1. 2. 1. Risk governance

Before approaching the concept of risk governance, an inevitable prerequisite is the definition of governance.

35 Veyret 2003, originally in French

36 Vinet 2007, originally in French

37 Peltier 2005, originally in French

38 Vinet 2007, originally in French

39 The first polders for instance were constructed in the 11th century. Source: Wikipedia, article about "polder": http://en.wikipedia.org/wiki/Polder

40 Thywissen 2006a

41 IRGC 2008

In the common language[42], governance is

> "The activity of governing a country or controlling a company or an organisation; the way in which a country is governed or a company or institution is controlled."

For the International Risk Governance Council (IRGC), "governance refers to the action, processes, traditions and institutions by which authority is exercised and decisions are taken and implemented"[43].

In both cases, the concept of governance refers to the way a community is governed, and takes into account the background that shapes the way it is done. But it also reflects to the idea of good governance, as mentioned in the common definition adopted by the members of the "Future in the Alps" programme: governance covers "the rules, processes and behaviour that affect the way in which individuals and institutions, public and private, manage their common affairs, particularly as regards openness, participation, effectiveness and coherence" [44]. For Berke & Smith "developing a plan is a process […] which provides an opportunity to engage a wide collection of stakeholders who have a vested interest in the final product"[45].

The essence of governance lies in participation. The act of governing is not reserved to those who detain the power, it is open to the participation of all actors of society. The American NOAA stated that involving stakeholders in management decisions can produce better outcomes, garner public support, bring light to important local knowledge, increase public understanding of issues or management decisions, reduce or resolve conflicts between stakeholders, increase compliance with laws and regulations, help agencies understand flaws in existing management strategies, and create new relationship among stakeholders[46].

Applying these principles to risk, a risk governance concept has emerged.

42 Oxford Dictionary 2005

43 IRGC 2008

44 Debarbieux 2006

45 Berke, Smith 2009

46 NOAA 2007

A comprehensive definition of risk governance is provided by the IRGC[47]:

> Risk governance deals with the identification, assessment, management, and communication of risks, in a broad context. It includes the totality of actors, rules, convention, processes and mechanisms, and is concerned with how relevant risk information is collected, analysed and communicated, and how management decisions are taken. It applies the principles of good governance that include transparency, effectiveness and efficiency, accountability, strategic focus, sustainability, equity and fairness, respect for the rule of law and the need for the chosen solutions to be politically and legally feasible as well as ethically and publicly acceptable.

In other words, risk governance covers the totality of the process of dealing with risk, and implies that this process is held in a democratic way.

Risk governance is composed of three processes:

- Risk assessment
- Risk management
- Risk communication

Some authors split the risk assessment and risk management in two phases, respectively pre-assessment and risk appraisal, and acceptability judgement and risk management. Thus, the IRGC proposes to schematise risk governance as follows.

47 IRGC 2005

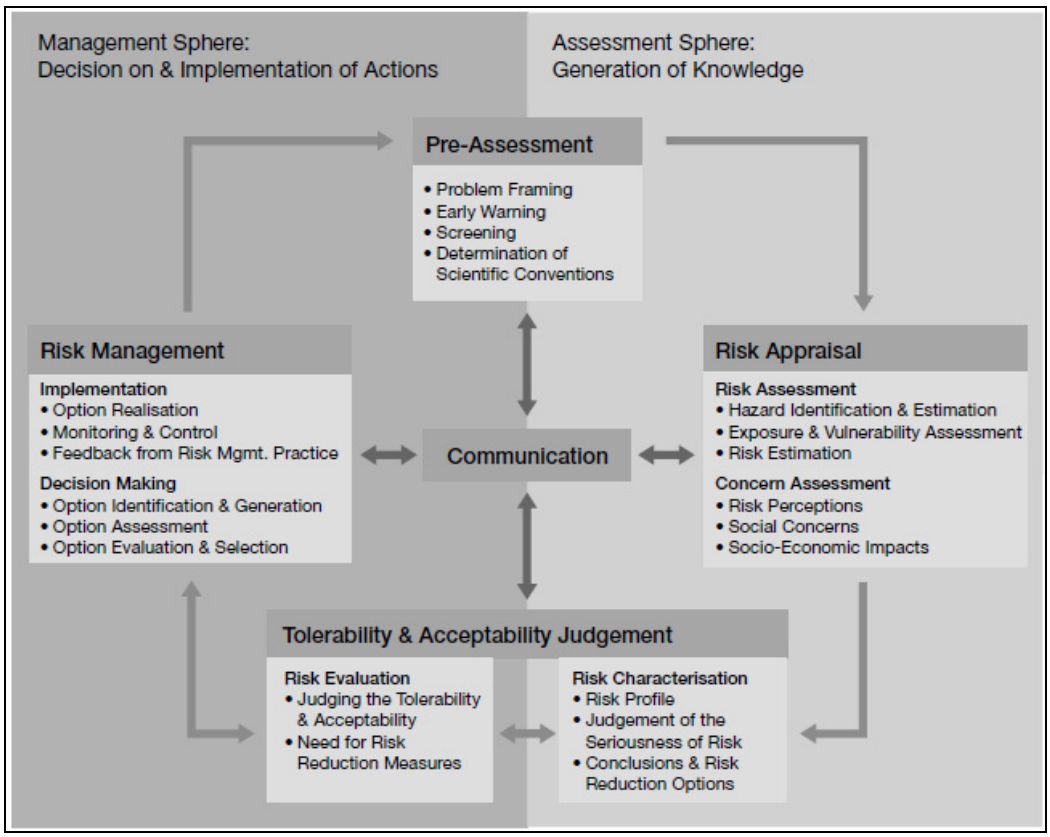


Figure 2. Risk governance framework. Source: IRGC, 2005

As with governance, there are "good risk governance" principles, at which an inclusive risk governance process has to be targeted. The TRUSTNET consortium identified seven key criteria of inclusive governance:

- Widely empowered individuals and groups of stakeholders
- A collaborative atmosphere of mutual respect and trust
- Stakeholders able to access, consider and question all relevant scientific evidence
- Practicable decisions and strategies, flexible and open to revision with time
- An open and transparent decision-making process recognised as legitimate and fair by the stakeholders
- Feedback automatically provided to the involved stakeholders on the decisions taken and at key points in the decision-making process
- A shared risk governance culture among the involved actors.

Spatial planning plays a role in this governance framework. In addition to the important input they can provide in all three phases, planners “serve as mediator and consensus builders”[48]. The

48 Berke, Smith 2009

intrinsic multidisciplinary character of spatial planning allows planners to have a broad view of a risk situation and the context in which it is embedded.

In the next parts, we will successively study the different components of risk governance: risk assessment, risk management, and risk communication.

1. 2. 2. Risk assessment

The first phase of the process of dealing with risk is the evaluation of risk. As a prerequisite, a potential risk has been identified and it has been decided (by authorities or by the scientific community for instance) to study this risk. The objective of this phase is to qualify the risk, quantitatively and/or qualitatively. For this purpose, three assessment processes are carried out: hazard assessment, vulnerability assessment, and finally risk assessment itself. They are followed by a judgement of acceptability that will condition the strategy selected to deal with a risk.

Evaluating the hazard

"The starting point of the risk assessment is the identification of hazards"[49]. The objective of this phase is to understand the mechanisms underlying the hazard and to obtain as much information as possible in order to facilitate the decision-making.

Natural hazards are "defined by the combination of a magnitude (energetic component), a probability of occurrence (time component) and an impact area (spatial component)[50]. Each of those components can be characterised.

The magnitude of a natural hazard is the expected intensity of the phenomenon. It is evaluated comparatively to similar phenomena, sometimes according to a defined scale. The table below shows some examples of criteria used for characterising magnitude associated with natural hazards.

49 Greiving, Fleischhauer 2006

50 Thouret, Leone 2003, originally in French

Hazard	Possible criteria
Earthquakes	Richter magnitude scale, from 0 to 10[51]
Volcanic eruptions	Volcanic explosivity index[52] (VEI), from 0 to 8
Floods	Water level, in metres
Tornadoes	TORRO scale[53], from T0 to T11
Mass movement	Volume of material displaced, in m^3

Figure 3. Examples of criteria used to characterise the magnitude of natural hazards

Source: own elaboration

The probability of occurrence of a natural hazard is estimated by analysing past events. When there are long series of reliable data on a type of event, it is possible to extrapolate the average frequency of the event, or to evaluate the return period of an event of a certain magnitude (e.g. the return period of floods with a water level of 5 metres). In some cases, it is not possible to consider a return period because of the nature of the phenomenon, for instance when the phenomenon is triggered by specific conditions (e.g. rock falls). In such situations, modelling the phenomenon can help forecasting its occurrence.

Most hazards, if not all, present a spatial component: they occur somewhere. This spatial dimension can be divided in three components:

- The occurring area, where the phenomenon happens. It is the point where the realisation of the risk takes places. Depending on the hazard involved, it can be very localised (e.g. a debris flow) or cover a wider zone (e.g. droughts);

- The impact area, where the phenomenon has consequences (direct or indirect). The directly affected area is easy to delimit, as it is the zone where casualties and physical damages (to buildings or to infrastructures) have been observed. The indirectly affected zone is more complicated to circumscribe as “indirect impacts have the potential to ripple out from areas of direct damage following disasters”[54]. It comprises the places that are economically impacted by the event (e.g. when floods damage a large factory that is the major employer in a community), socially impacted (e.g. when people are homeless after a disaster) or environmentally impacted (e.g. when a mud flow scours the banks of a river, destroying the biotope);

51 Richter magnitude scale is base on the energy released by an earthquake

52 The volcanic explosivity index is based on eight physical characteristics of volcanic eruptions

53 The TORRO scale is derived from the Beaufort scale, and is based on wind speed

54 Tierney, Lindell, Perry 2001

- The triggering area, in which events happening can provoke the occurrence of the phenomenon. For instance, concerning landslides, the triggering area would contain the slope, the area upslope (watercourses, possible presence of snow by increasing the presence of water in the slope can participate in the triggering of a landslide), the area downslope (removing of material by a river or because of human activities can create instabilities), the lithosphere under the slope (earthquakes can trigger landslides). In a wider acceptance, the atmosphere could also be counted in the triggering area, since erosion processes due to winds and cold temperatures (cryoclasty) can contribute to create landslides conditions.

In some cases, these components are hard to identify, in particular when the triggering factors of a phenomenon are not known, or when the consequences cannot be clearly forecasted. For some hazards, the extent of the impact area is extremely wide (e.g. floods in large river basin), even planetary (volcanic eruption producing clouds of ashes).

Although all risks present this spatial dimension, not all of them are spatially relevant. Indeed, the spatial study of some hazards can prove to be not-significant. A hazard is considered spatially relevant when "its occurrence is limited to a certain disaster area, which is regularly or irregularly prone to hazards (e.g. river flooding, storm surges, volcanic eruption). Spatially non-relevant hazards occur more or less anywhere (e.g. flash floods, car accidents, meteorite impacts)"[55].

According to this definition, can natural hazards be stated as spatially relevant? Obviously, yes. All natural hazards, although very different in their natures and processes, happen in specific geographic or climatic contexts. For instance, avalanches occur in mountainous areas, on snow covered versants. Volcanic eruptions, though they can have consequences on a large scale, happen locally. In some cases, the specific spatiality of hazards is indicated in their denomination: forest fires, river floods, tropical storms.

The assessment of natural hazards is "mainly a determination on scientific and technical findings"[56]. Therefore, it is the domain of geosciences (geomorphology, hydrology…).

Hazard assessment can result in quantitative or qualitative data. Either way, the outcomes of hazard assessment provide important data for the evaluation of risk and for the decision-making process. They can be presented as raw data or shaped into a specific form (e.g. database). They can also be compared to data concerning another hazard.

55 Fleischhauer 2006b

56 Ibid.

Hazards can also be spatially represented in the form of hazard maps. Historically, the first maps realised were presenting the known past events on a particular territory, concerning a particular phenomenon, for instance past floods or observed avalanches. These maps aimed at displaying the information the different experts gathered on the history of a hazard, allowing a deductive work on preferential behaviours of the processes.

With the extension of knowledge about the phenomenon involved, it has then been possible to develop hazard maps, showing for a territory the zones affected by a specific hazard. They can be elaborated for a specific intensity and estimated period of return of the hazard, or more generally present the zone in which the hazard is expected to be encountered.

Some hazards offer the possibility to create susceptibility maps, based on a prediction of the likelihood of the phenomenon to happen in a given point. It is the case, in particular, for landslides.

After having characterised the hazard, the following step is the evaluation of vulnerability.

Evaluating the vulnerability

As above mentioned, the concept of vulnerability itself is hard to define, and depends largely of the context in which it is used. Moreover, even when the acceptance of the term vulnerability is clear, its assessment is a complicated task. "Vulnerability cannot be assessed in absolute terms" but should be assessed "with reference to specific spatial and temporal scale"[57]. Vulnerability is not constant, it is perpetually changing. Even the smallest details, such as the time of the day, can influence vulnerability: a community might be more vulnerable to a hazard during nights than during days for instance.

Because vulnerability has many dimensions, it is very arduous to summarise it into one result. It is not realistic to expect the outcome of vulnerability assessment to be one number, rate, or level. There are too many components involved.

Many scientists and many research projects have attempted to define a frame for vulnerability assessment, resulting in many different concepts and methods. Concerning evaluation of vulnerability in the context of natural hazards, a very interesting and complete work has been

57 Rashed, Weeks 2003

carried out by the ESPON Hazards Project[58] and applied to the European space in order to produce an aggregated vulnerability map[59].

In the frame they proposed, the members of the ESPON Hazards Project considered vulnerability as a three-dimensional concept. They recognised:

- An economic dimension of vulnerability, taking into account direct economic costs of the damages (direct losses compensated by insurance, reconstruction costs…) as well as indirect and long-term effects (unemployment, communication networks out of order…). It represents the risk to production, distribution and consumption

- A social dimension of vulnerability, dealing with the vulnerability of people and institutions, and their coping capacity

- An ecological dimension of vulnerability, acknowledging ecosystem or environmental vulnerability. Although damages caused by a natural event on natural environment are considered as a natural process and not included in the definition of vulnerability, they can have repercussions or trigger other effects that will concern human societies (e.g. if a landslide causes the settling of a natural dam across a river it is not part of vulnerability, but the severe consequences that the breaking of this dam could have on human settlements do count in the overall evaluation of vulnerability).

This classification can be extended with the consideration of sub-categories of vulnerability, such as institutional or cultural vulnerability (both can be grouped under the social dimension).

Practically, vulnerability assessment "will often limit itself to a certain scenario – that is, one event one magnitude – for which an analysis is carried out"[60]. It is then closer to an analysis of the stakes which, unlike a vulnerability analysis, only considers the physical elements at risk (structural vulnerability). Vulnerability can be evaluated via a wider range of criteria, including non-structural elements, either qualitatively or quantitatively described, such as demographic situation, economic situation, environmental situation (interaction between humans and their natural environment), institutional settings, or risk culture.

58 Schmidt-Thomé 2006

59 Schmidt-Thomé, Kallio 2006

60 Thywissen 2006a

It is also possible to map the vulnerability to hazards, either to any hazard or to a specific one. The map can present simply the stakes, such as buildings, sensible buildings (hospital, schools), infrastructure, or any physical element that would be particularly vulnerable to the manifestation of a risk. More complicated are the actual vulnerability maps, which aim at presenting not only direct but also indirect effects. For instance, such document will highlight the important transport axes, take into account the different level of vulnerability to a given risk, or stress the strategic places that have to be protected in priority.

When both hazard and vulnerability have been evaluated, it is possible to assess the risk itself.

Evaluating the risk

As Chauvin and Hermand pointed[61], "risk assessment has two parts: "objective" risk assessment of experts and "subjective" risk assessment of lay people, called risk perception".

The "expert" risk assessment, risk analysis, is based on a mathematical (or statistical) approach, combining the outcomes of hazard and vulnerability assessment, in order to produce a risk value, quantitative or qualitative. It is also "partly subjective because the precise knowledge required to be truly objective is rarely available"[62].

Risk perception is based on other criteria and affected by psychological biases. It changes and evolves along time, and is depending on individuals and communities.

Risk analysis

Risk analysis is “the attempt to determine qualitatively and, as far as possible, quantitatively by means of scientific methods and as accurately as possible the probabilities of occurrence of concrete damage or the probability function of the magnitude of damage. This is done on the basis of observation, modelling and scenario formulation”[63]. Experts use a probabilistic approach to risk. Basically, risk is considered as the product of hazard and vulnerability, and can be evaluated as such.

61 Chauvin, Hermand 2006

62 Greiving, Fleischhauer 2006

63 Hay, WBGU 2000

The formula:

Risk = Hazard x Vulnerability

can be applied literally to obtain a qualitative or quantitative evaluation of risk. This can be achieved for instance using a simple matrix as the one figured below.

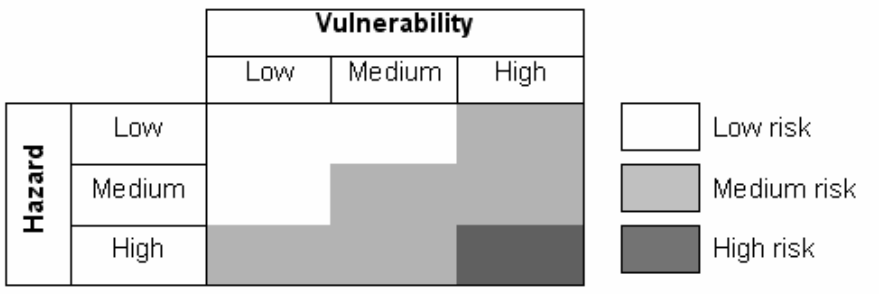


Figure 4. Example of risk matrix

Source: own elaboration

The decision where to fix the limits between categories can be made by experts with statistical thresholds, or by decision-makers following also political or socio-economic concern (see further in this chapter, acceptability).

Alternatively, a more detailed calculation can be undertaken with a formula based on the assumption that risk is a function of hazard and vulnerability. The criteria selected for the calculation (e.g. probability of occurrence, frequency, magnitude, or extend of damages for hazard, and expected cost, number of casualties or injuries for vulnerability) can be weighed with factors in order to obtain a quantitative evaluation.

The outcomes of this analysis of risk can be used further in the process of dealing with risk, to compare the risk with others (places, situations, scenarios) or can be fed into the debate about the acceptability of the risk. The outcome can be presented as a collection of data, or spatially as a map.

Risk perception

The perception that people have of a risk situation differs from the understanding experts and scientists have of it. It "does not need to orient itself to the stringent criteria of methodologically

founded risk analysis"[64]. Risk perception is "determined by social norms and rules"[65] and is influenced by several elements. Covello[66] acknowledged those elements: catastrophic potential, familiarity with the risk, understanding, uncertainty, personal control of the risk, willingly exposure (chosen risks Vs. sustained risks), duration of the effects, effects on future generations, terrifying effects, institutional engagement, frequency of the event, media coverage, reversibility of effects, proximity in time and space.

This list is not comprehensive. Many other elements can influence the perception of a risk situation. In particular, psychological biases can modify the understanding of a given setting. WBGU[67] gives two very interesting examples of heuristics:

- Availability heuristic, stating that recent events, or events that benefited from a large media cover, are deemed more probable than others. Therefore, if a hazard did not create any disaster in recent years it tends to be forgotten;

- Gambler's fallacy, based on the idea that an improbable event cannot happen several times in succession. Therefore, when a disaster is said to have "a hundred years return period" people expect that it will not happen again before a hundred years.

Risk perception is not negligible in risk assessment. "If people adjust their behaviour as a result of their perceptions, then biases or other problems related to risk perception are crucial in determining resulting actions"[68]. As Berke & Smith state "the anecdotal stories of "old timers" who experienced previous events can provide valuable insights"[69].

Culture is also an important factor. "Individual risk perception is also shaped by how the community deals with the risk"[70]. Dauphiné[71] mentioned two eloquent examples. In Bangladesh, people distinguish two types of floods, "the little and useful floods (barsha) and the devastating floods (bonna)". The difference is the water level. For those people cultivating rice, floods, that bring sediments, are enriching their soil. Thus, they consider them as opportunities. The second example compares the behaviour regarding the risk of earthquakes of inhabitants of San Fernando

64 Hay, WBGU 2000
65 Renn 1992
66 Covello 1992
67 Hay, WBGU 2000
68 Etkin 2009
69 Berke, Smith 2009
70 Greiving, Fleischhauer 2006
71 Dauphiné 2003, originally in French

(California) and Kanazawa (Japan). When "Americans fill their freezers and sign for an insurance, Japanese take part in training exercises and plan how to gather their family after a catastrophe". Risk perception varies on the individual level, whereas risk culture is shared by a group of persons. Glatron defines it as "a knowledge, a collective baggage shared by all those who belong to a given society"[72].

Those cultural differences will be considered later in this study, with a particular focus on how risk culture influences the way European countries deal with natural risks (see chapters 2.2 and 2.4).
Risk assessment is considered by confronting risk analysis and risk perceptions. This allows pointing out the gaps between the points of view of experts and non experts. It is necessary to understand the dynamic of risk in a given territory before deciding upon a strategy to address it. Risk is a societal construct, and the perception of threatened people, as well as the risk cultures existing in the risk prone areas, shape the "real risk". They can increase vulnerability (e.g. if people are misinformed about a risk they might have unadapted behaviour, or if the local agriculture is using flood plains the economic system is vulnerable).

The objective of risk assessment is to gather knowledge about the existing risk, and to provide data for informed decision-making. This information can and should be made available, with suitable explanations, to all stakeholders and to the public, as it is clearly important to inform potentially affected people.

This information can be spatialised on a map. By crossing hazard maps and vulnerability maps, experts can extrapolate risk maps. These documents result of a complex expert evaluation. They show the different levels of risk corresponding to different zones of a given territory.

Risk maps stemming from a compilation of hazard and vulnerability maps are developed, but the pertinence of the criteria and functions chosen to derive the risk levels is questioned. Such maps demand a quantitative, or semi-quantitative evaluation of vulnerability, which is problematic for many scientists: how can vulnerability be reduced into numbers or classes?

Acceptability

When risk assessment is done, and before risk management can start, a crucial intermediate step has to be taken: the risk acceptability must be evaluated. This represents at the same time the conclusion of risk assessment (establishing if the risk is considered, and will be treated as,

72 Glatron 2003, originally in French

acceptable or not) and the starting point of risk management (defining the goals that will be pursued by management policies and strategies).

The acceptability of a risk is the extent to which it can be accepted or tolerated by a community. The risk-related decisions depend on this judgement. There are three level of acceptability, and they are "disconnected from the intensity of risk"[73]. A risk can be acceptable, tolerable, or intolerable:

- A risk is considered as acceptable when both its probability of occurrence and its potential consequences are low, or when the community is prepared to cope with an eventual event, so that the cost (financial and social) of protection or reduction measures would be too high considering their expected benefit

- A risk is considered as tolerable when the phenomenon or hazard provides a benefit to the community that is considered worthwhile taking the risk, or when the costs (financial and social) of further protection and reduction measures would be too high or disproportionate

- A risk is considered as intolerable when its probability of occurrence and/or the potential consequences are high, and when it overpasses the limits of the two previous categories

WBGU suggests different names for a similar classification, where risks are positioned on a 2D graph according to their probability of occurrence and the expected extent of damages (figure below). They can be considered:

- In the normal area (acceptable risk)

- In the transitional area (tolerable risk)

- In the prohibited area (intolerable risk).

73 Dauphiné 2003, originally in French

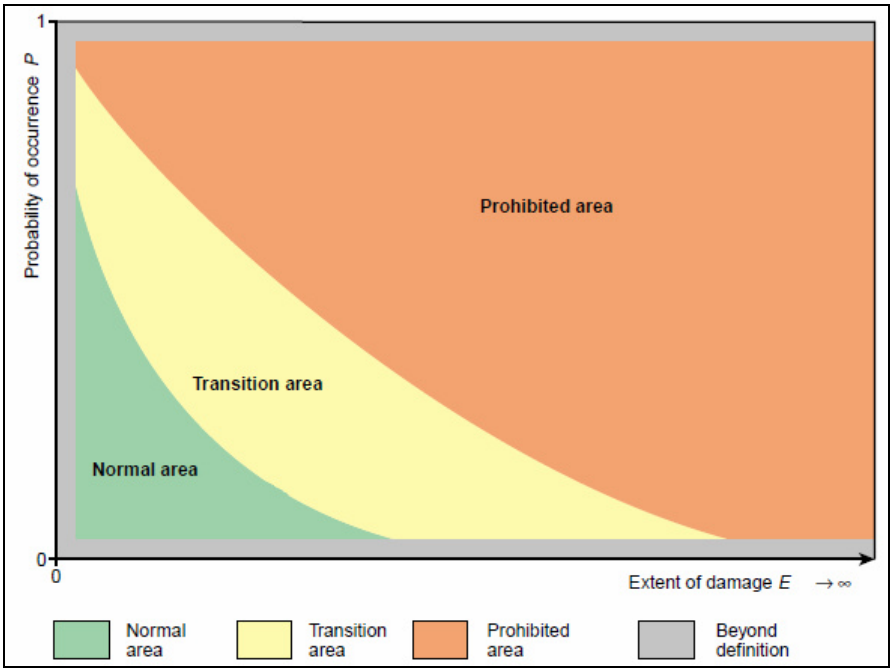


Figure 5. Normal, transition and prohibited area of risk.

Source: Hay, WBGU 2000

This judgement of acceptability is often reduced to a cost-benefit analysis, weighing two aspects of potential protection or reduction measures:

- their cost for society, either direct (construction costs) or indirect (land use restrictions)
- their benefit for society, either direct (avoiding the costs of reconstruction, and compensation of damages) or indirect (allowing the development of new activities or new settlements)

Here again risk perception plays a considerable role. "Risk managers need to consider [risk perception] when deciding whether or not a risk should be taken"[74]. WBGU[75] recommends to "integrate values and perceptions in the negotiations of risk acceptance" both in policy making and in research.

After this phase of judgement, the process of risk management can begin.

74 IRGC 2005

75 Hay, WBGU 2000

1. 2. 3. Risk management

Risk management is the process of dealing with an identified and evaluated risk "by implementing decisions that aim at tolerating or altering risks"[76]. It can be divided in four phases: mitigation, preparedness, response and recovery, and constitutes a cycle.

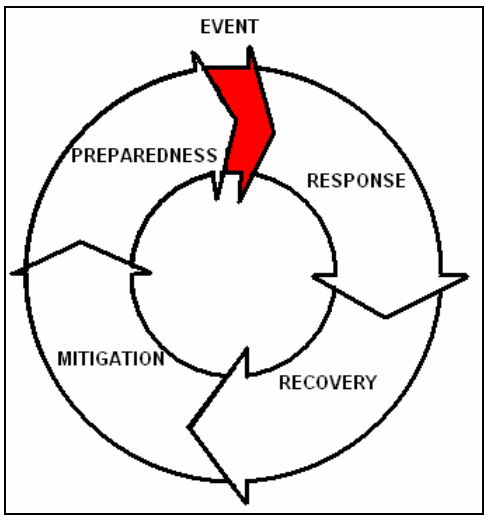


Figure 6. Risk management cycle

Source: own elaboration

An important prerequisite for risk management is the definition of the scale of intervention. In most European countries “risk is integrated at several levels of decision, national regional, local, but in most cases one of them has a pre-eminent place (regional in Germany with the Länder, local in England or Wales)”[77].

Mitigation

The mitigation phase consists in "actions taken before a disaster to decrease vulnerability, primarily through measures that reduce casualties and exposure to damage and disruption or that provide passive protection during disaster impact"[78]. Those measures can be divided in two categories: those reducing the hazard, and those reducing the vulnerability. It could be brought close to the adage:

> An ounce of prevention is worth a pound of cure

76 Greiving, Fleischhauer 2006

77 Veyret 2003, originally in French

78 Tierney, Lindell, Perry 2001

It is not possible to prevent natural phenomena to happen, but their frequency or their magnitude can be lowered in some cases. This can be achieved with structural measures, for instance the drainage of a slope (mudslides), the construction of retaining walls (landslides) or the settlement of protection nets (rockfalls).

There is a broad range of measures intending to reduce vulnerability to natural risks, and "land use planning provides an important means to achieve mitigation by influencing human settlements patterns as its analytical tools and policy recommendations are inherently geospatial in nature, affecting the location, type and density of development"[79]. Mitigation and land use planning share an orientation toward the future. "They are both proactive rather than reactive"[80].

According to Greiving, Mitigation measures taken by planners, at different levels, can be divided according to four objectives[81]:

- Keeping areas free of development, because they are prone to hazards, needed to lower the effects of hazards or needed to guarantee the effectiveness of response activities;

- Differentiated decision on land use, allowing certain types of structures or activities to be settled in a risk prone area

- Recommendations in legally binding land use or zoning plans (e.g. building standards)

- Influence on hazard intensity and frequency by spatial planning (e.g. protective forest, river flood retention areas)

Preparedness

Emergency preparedness consists in measures taken to allow a society to respond to a crisis situation. As in the Latin maxim, "*si vis pacem para bellum*". To ensure that the coming natural disaster will not have catastrophic effects on a society, everything must be prepared to deal with it. This includes "developing emergency response plans, training employees and response personnel on what to do in an emergency situation, acquiring needed equipment, supplies and materials, and

79 Berke, Smith 2009

80 Ibid.

81 Greiving 2006b

conducting drills and exercises"[82]. Most of these activities “can be engaged in by various social units: households, businesses and governmental agencies, communities, supra-community entities such as states and regions, and entire societies[83]”.

Preparedness also covers the short period of time between warning and the actual event, during which "evacuation and temporary property protection"[84] measures can be taken.

Response

The response phase concerns the materialisation of the risk. It turns into an actual event. This phase is highly facilitated when preparedness measures have been taken and applied.

Response is mainly concerned with "emergency aid and assistance, during or following a disaster"[85].

Response is mainly the responsibility of emergency management structures, in which a participative approach is usually not advised. Therefore, it will not be further addressed in this study.

Recovery

Recovery is the post-disaster phase of risk management. After a crisis, it is necessary to rebuild, repair the damages. "The immediate goals of recovery are to restore the area's economic functions and to replace lost housing"[86]. In the days, or weeks, following the disaster, the insurance system compensates the losses.

Although recovery actions primarily focus on physical damages, they "also aim at reversing whatever negative effects a disaster may have had on the quality of life in an affected community and on the psychosocial well-being of victims".[87]

82 Tierney, Lindell, Perry 2001

83 Ibid.

84 Greiving, Fleischhauer 2006

85 Ibid.

86 Olshansky 2009

87 Tierney, Lindell, Perry 2001

Recovery encompasses a large spectrum of measures. The most obvious concern is damages repair, either physically (reconstruction) or financially (compensation). Insurance (and reinsurance) companies hold a central place in this phase.

Spatial planning can also play a role in recovery. As Berke & Smith[88] put it "after every disaster virtually everyone poses the question, "If we are going to so much trouble and expense to rebuild, why should we simply reproduce what we had before? Why can't we build something better?" ". Based on the observation that reconstruction is expensive in money, but also in time and effort, and that most natural risks are likely to affect the same zone several times, the question of the direction of reconstruction can be posed. Wouldn't it make sense to rebuild in a more resilient way? Further, wouldn't it make sense to avoid reconstructing in a disaster prone area, and relocate to a safer place?

In this case, the direct aftermath of a disaster can be seen as a "window of opportunity" for changes in the risk management strategies.

From a spatial planning perspective, this short time frame could be used to apply new land-use plans. Of course, this supposes that such plans were prepared and made available before the disaster, as they require long reflection and negotiation that cannot be done under the time pressure of post-disaster. Such strategies require "the voluntary involvement of residents" to avoid conflicts and refusal to move, because relocation "is disruptive of social networks and economic livelihoods"[89].

When recovery actions come to an end, a feedback loop closes the management cycle, bridging the gap with mitigation. The lessons learnt during and after the disaster must be included in the knowledge corpus, where they can support the improvement of mitigation and preparedness. This feedback phase is crucial, and helps increasing resilience and coping capacity.

1. 2. 4. Risk communication

Risk communication is "a process of exchange (communication and comprehension) of information among actors concerning risk analysis (perception), definitions, evaluation and management"[90]. The TRUSTNET network explains the emergence of risk communication as a solution to the problem of "public resistance to technological projects", which was "perceived by experts as the

88 Berke, Smith 2009

89 Olshansky 2009

90 Wiedemann, Rohrmann, Jungermann 1991

results of a false understanding of the real risk, a result of a lack of information, a lack of scientific knowledge, or a lack of education"[91]. Therefore, the first aim of risk communication was to provide more information about hazards and risks to the public to persuade people that the decisions made were legitimate.

Unfortunately, it long lasted a one-way communication process, where experts and decision-makers where "transferring information to the public in order to help them understand the decision"[92]. Thus, the information providers did not take into account the expectations of their audience, and there was no feedback process. In fact, it was not a "communication" process but an "information" process.

Nowadays, this is better understood, and communication starts appearing at every stage of the process of "dealing with risk", between all involved stakeholders, as a central element of risk governance. IRGC states that it "includes not only informing people of a risk or of a risk management decision, but also establishing the two-way dialogue needed at all stages of the risk handling process"[93].

"Risk management contexts pose challenges of integrating the best available science with sensitive social and political processes that seek ends of responsiveness to public concerns, legitimacy with respect to potentially affected stakeholders and practicality in terms of producing implementable outcomes"[94].

During the prevention phase, communication can take the form of preventive information (from experts and practitioners to the public), education (directed to children), training (directed to practitioners). The whole range of communication means is used, from institutional communication (e.g. information leaflets, public meetings) to everyday media (for instance with reportages in newspapers or documentaries on television). Internet plays a growing role in this process, with its large offer of websites dedicated to natural phenomena and their impact.

During the preparedness, response and recovery phases, communication between all actors is crucial and affects deeply the efficiency of the response. The information provided to affected people, either before (alert, evacuation) or during and after the event itself, can avoid additional damages due to misunderstandings and unsafe behaviours. Inversely, affected people can feed

91 TRUSTNET 1999

92 Ibid.

93 IRGC 2005

94 Forester, Thechkethil 2009

back to practitioners and experts information about the crisis "on the spot" and observations they have done.

As stated in the "good risk governance" principles, trust is a key element of risk communication. The whole process is hindered if the parties engaged in dialogue do not trust each other. On another level, this is also true for information provided by decision-makers, experts or scientists. If the target group does not trust the source, the information will not be used or accepted.

This can become very problematic due to the normative quality of decision-making in risk management. "The authority in charge has to decide about the main planning goals that are related to dealing with natural hazards"[95]. The issue of trust is crucial here. Löfstedt explain that "if the public perceives the regulator to be competent, fair and efficient (the so-called three dimensions of trust) based on previous decisions, the public is highly likely to trust the regulatory bodies in the future"[96]. Inversely, if the public questions past decisions, it is likely that future decisions will not be accepted.

This also applies between actors of risk governance, either horizontally (different actors involved on the same territory) or vertically (different levels of decision applying to a territory). The importance of coordination and cooperation among all those actors has to be acknowledged (the central place of trust will be further addressed in 2.3).

95 Greiving, Fleischhauer 2006

96 Löfstedt 2009

1. 3. Research hypotheses

This study will explore two research hypotheses by the mean of a literature review, then translate them into practical questions to be addressed by an empirical study.

> 1. Trust in decision makers is an issue in natural risks management, and a deeper involvement of all stakeholders groups in the decision making process could help rebuild trust.

This hypothesis is supported by the assumption that most strategies applied to risk management in Europe present a cleavage between two "camps": those who take decisions, and those to whom decisions apply.

Traditionally, decision-makers refer to experts and scientists to obtain data and information about a risk, and then take decisions. This conducts to an obvious problem: the interests, expectations and concerns of people who actually live with the risk are not necessarily heard or considered.

Another fact leading to this hypothesis is the increasing distrust in public authorities. When the relevance and fairness of decisions is questioned, policies and strategies can end up being refused, not applied, not respected, which clearly reduces their efficiency.

Inclusive risk governance could be a solution, as its benefits are affirmed by many scientists and experts (IRGC, WBGU, Future in the Alps, …), although sometimes with a critical angle (Burby).

> 2. Because of the existence of different risk cultures and risk perceptions, transferring practices and strategies between different sites is complex. Elements that need adaptation could be identified beforehand to facilitate sharing methods among regions or countries.

This hypothesis is based on the observation that efficient risk management strategies exist in Europe, and are successfully applied. Although it could be considered to simply extend them to all territories, they rely on local risk cultures, and these cultures vary largely across European space. Nevertheless, this should not stop the willingness to share good practices.

In this perspective, it would be of interest to identify which elements of a successful policy depend on the local cultures, and how they could be translated into other contexts.

The present study will first confront those hypotheses with the reality of risk on the field.

First, theoretical considerations based on a review of existing literature will be presented, addressing successively natural hazards and risks in Europe, how European countries deal with them, and the limits of the methods currently applied.

Then, a focus will be given on the question of Europe of risks.

Following the translation of the research hypotheses that underlie this work into guiding questions, the empirical part of the study will be presented.

Conclusions on the results will end this study.

2. Natural hazards and risks in Europe: situation, strategies and perspectives

2. 1. Natural hazards and risks in Europe

The European space offers a large diversity of geophysical settings[97], from wide plains to high mountains, from the coasts of the Atlantic Ocean to the Ural Mountains, from the Scandinavian Peninsula to the coasts of the Mediterranean Sea. Latitude, altitude and distance to the ocean combined shape different climatic zones. The joint influence of those elements creates a variety of natural hazards affecting the European territory diversely.

These natural hazard encounter various societies presenting various types and range of vulnerability, due to the differing contexts in European regions: demography, socio-economic situation, legislative framework… Many regions share a common feature: populations and activities are often concentrated in hazard prone areas. As Etkin explains, "this is often the case because of the proximity to natural resources or good transport"[98]. The settlement of cities in these areas leads to the existence of high risks "and it follows that as these cities grow in size the risk will continue to increase"[99].

Moreover, Western societies are threatened by other types of risks, some of which they created themselves. Industrial activities or transport networks are necessary but induce the existence of new risks. Other risks, for instance concerning health (e.g. epidemics) or organisation (e.g. bankruptcy), also have to be taken into account. Addressing each of them separately is not sufficient, they can interact and lead to "domino effects" where the realisation of a risk can trigger the realisation of another. This was recently illustrated by the earthquake and tsunami in Japan in march 2011, and the consequences they had on the nuclear power plant in Fukushima. A multihazard vision is highly recommended when addressing natural risks.

As a result of the encounter of natural hazards and societies, European space is threatened by several natural risks. They can be categorised depending on the type of phenomena they are resulting from: hydrometeorological, geomorphological, or man-induced.

The hydrometeorological category encompasses all risks resulting from the action of atmospherical and water-related processes: floods, storms, tsunamis, droughts, extreme temperatures. The geomorphological category includes the risks associated to earth movements: landslides,

97 Fleischhauer 2006a

98 Etkin 2009

99 Ibid.

earthquakes, volcanic eruption. The last category covers risks that are at least partly man-induced, forest fires and dam breaking[100].

Some of those hazards are spatially widespread (e.g. floods) while some others are specific to a particular area (avalanches in mountains, storm surges on the coasts of northern Europe).

Floods

Floods can be defined as “high-water staged where water overflows its natural or artificial banks onto normally dry land”[101]. The large river basins in Central Europe (Rhine, Danube, Elbe, Oder, Rhone), and more largely and with lower intensity almost all river basins are prone to floods of various types (flash floods, torrential floods, urban floods) and intensities.

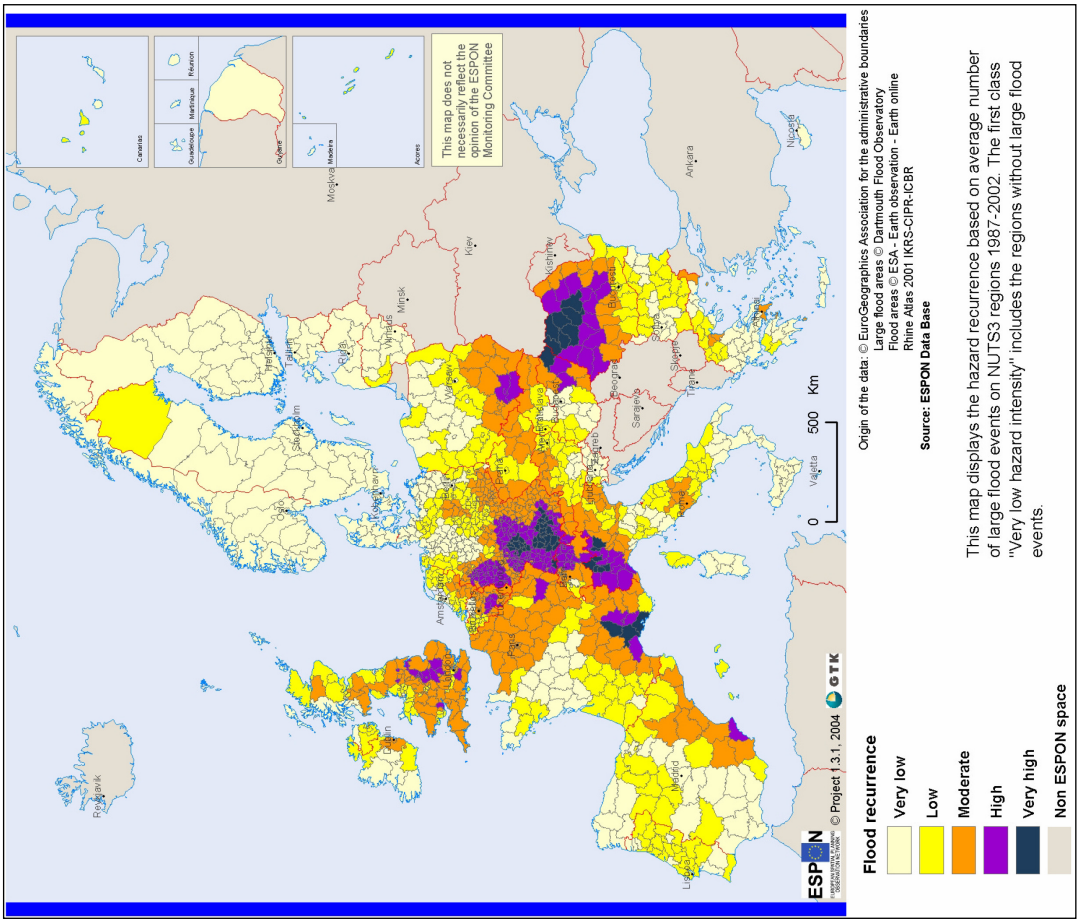


Figure 7. Map of flood recurrence in Europe. Source: Schmidt-Thomé, Kallio 2006

100 Although dams are not natural, the effects resulting from their possible breaking (wave, submersion, release of energy) are considered as natural phenomena

101 Schmidt-Thomé, Kallio 2006

Vulnerability to floods is increased by the modification and occupation of river beds. “Floods have become an increasing problem for the built-up environment since human beings have started to change, straighten and relocate river beds, and also by settling in low lying areas close to rivers, often in natural flood prone areas”[102]. Direct damages from floods result mainly from the submersion of buildings (lasting from a few hours in the case of flash floods to several weeks in large basin floods).

Storms

Storms are concentrated fast winds sweeping more or less large areas. Continental Europe experiences mainly tornadoes and regional winter storms[103]. According to reinsurance companies, regional storms are the “highest cause for economic and insured losses”[104] due to natural risks in Europe.

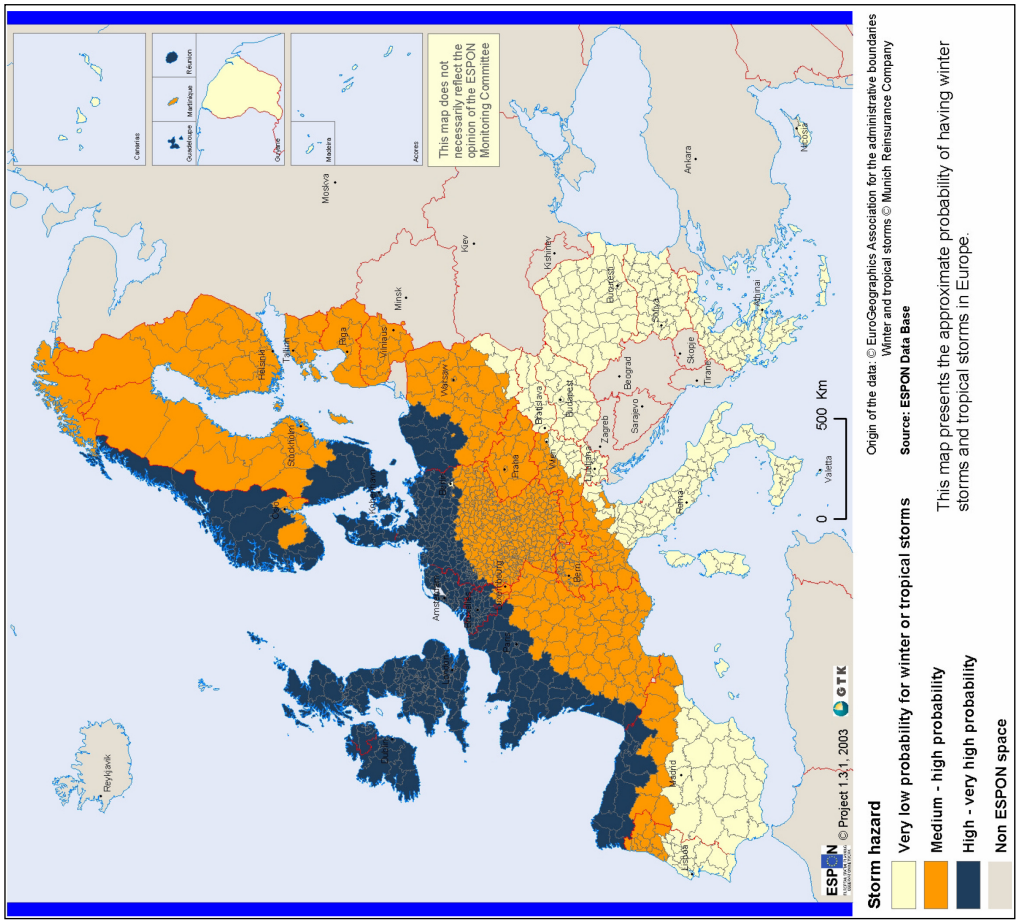


Figure 8. Map of probability of storms in Europe. Source: Schmidt-Thomé, Kallio 2006

102 Schmidt-Thomé, Kallio 2006

103 Some overseas territories of European countries face tropical cyclones, for instance Guadeloupe, Martinique or Réunion Islands.

104 Schmidt-Thomé, Kallio 2006

Storms sweep a wide stripe of European regions, from the Atlantic Ocean to the North Sea coasts, and with lower intensity and frequency Central and Western Europe.

Storms cause direct and indirect damages on buildings and infrastructures. Trees collapsing might interrupt transport circulation, or destroy parts of energy supply networks.

Tsunamis

A tsunami (from the Japanese expression meaning “large harbour wave”) is “a series of waves generated when a body of water is rapidly displaced on a massive scale. It is caused by earthquakes, volcanic activities and meteorite impacts”.[105]

In Europe, the risk of tsunami is present on the coasts of Mediterranean Sea, Black Sea, the British Isles and the western coasts of Norway (see map below). It can also affect fjords in the scandinavian peninsula.

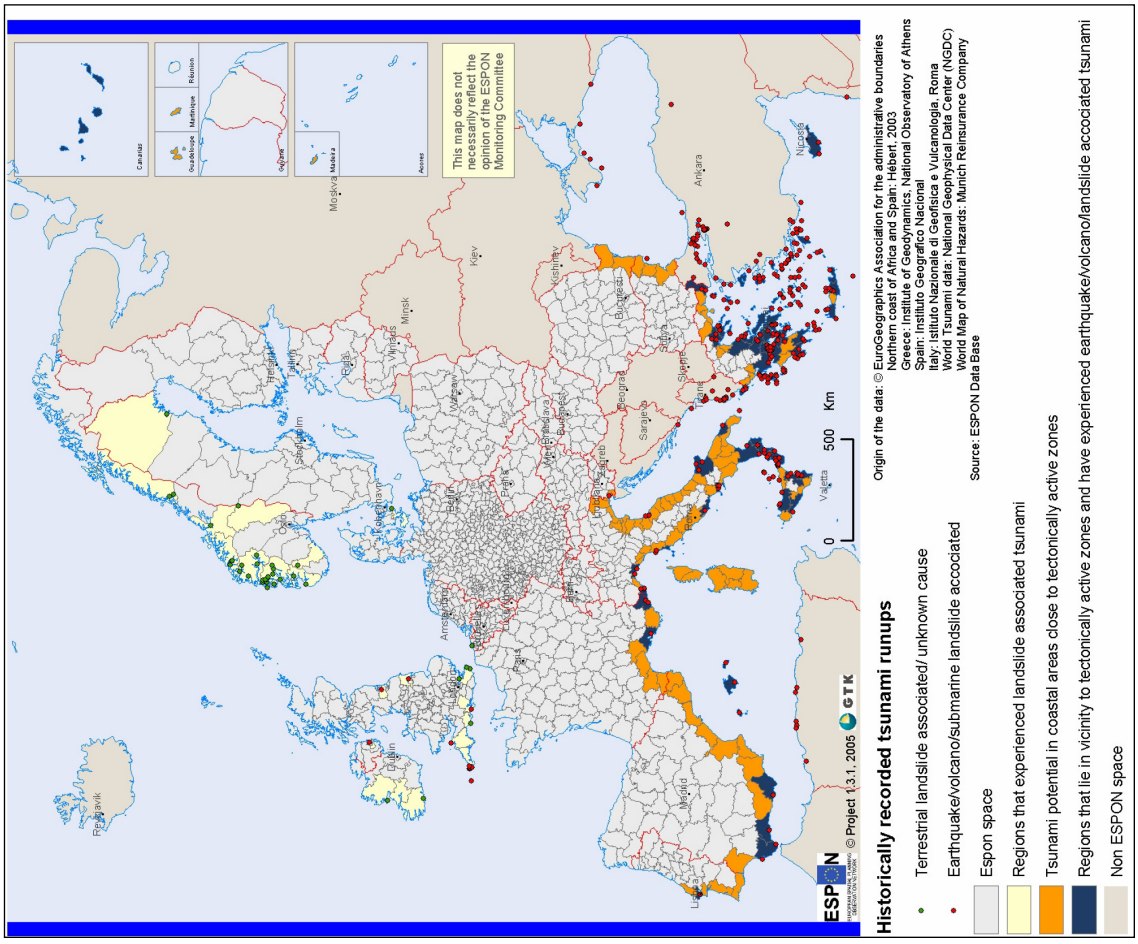


Figure 9. Map of recorded tsunamis in Europe. Source: Schmidt-Thomé, Kallio 2006

105 Schmidt-Thomé, Kallio 2006

Tsunamis cause damages “both because of their destructive energy and the extensive floods” they generate[106].

Droughts

Droughts are periods of scarcity or lack of water. According to Moneo & Iglesias[107] they can be subdivided into three types: “meteorological droughts (levels of precipitation), hydrological droughts (water level in rivers, lakes, reservoirs and aquifers) and agricultural droughts (availability of water for crops)”.

All European space is potentially concerned with droughts of various severity.

Droughts consequences, both direct and indirect, can lead to long-term effects: decrease of agricultural production, reduction or even shutting down of power production and industrial activities.

Extreme temperatures

Extreme temperature refer to periods of time when “temperatures are significantly higher or lower than the average temperature of a regional climate”[108]. Two types are differentiated: heat waves and cold waves. Heat waves usually happen in summer and cold waves in winter.

Both can affect human health (in different ways), especially the more vulnerable groups (babies and infants, elders, poor, homeless). They can also cause damages to power production and economic activities (heat can lower the availability of water used for instance to cool power plants or for industrial and agricultural activities, cold can damage structures such as pipes) which, associated to an increases demand in power (heating systems / cooling systems) can lead to serious problems in power distribution.

Extreme temperatures affect most of European space. Although the hazard itself is not necessarily of high magnitude or frequency, vulnerability towards heat and cold waves varies strongly between regions. This is partly due to the existence of risk cultures (see chapter 2.4), and was illustrated for instance during the heat wave of summer of 2003 in France. In southern regions where people are used to deal with high temperatures, the increase was addressed by reinforcing traditional

106 Schmidt-Thomé, Kallio 2006

107 Moneo, Iglesias 2004

108 Schmidt-Thomé, Kallio 2006

"measures" to stand the heat (closing the window shutters, switching activity time earlier in the day, avoiding activities outside during the afternoon, drinking more water) whereas in northern regions where these temperatures are completely unusual, people did not amend their life habits and suffered more from the heat. This was reflected in the excess of deaths during this period, stronger in the northern half of the country and much lower in the south[109].

Landslides

The ESPON Hazards project proposes a definition of landslides as "the hazard of gravity forced mass movements of material on a slope[110]". Depending on contextual factors (local geology, relief, precipitations and hydrology, human action…) landslides can take different forms: rockfalls, entire slope failures, mud or debris flows, snow avalanches, expansive clays, collapsing of caves, coastal erosion. Each type presents its own movement characteristics (velocity, viscosity, behaviour). A snow avalanche does not follow the same patterns as a debris flow.

Landslides affect a large part of Europe, some types of landslides being spatially localised: snow avalanches in mountains, coastal erosion on the littoral.

Figure 10. Picture of a coastal landslide in England (Blackgang, Isle of Wight, 2008)
Source: personal picture

109 Ministère de la Santé, de la Jeunesse, des Sports et de la vie associative, Ministère de l'Écologie, de l'Énergie, du Développement Durable et de l'Aménagement du territoire, 2008, Valleron & Boumendil 2004 , originally in French
110 Schmidt-Thomé, Kallio 2006

Figure 11. Picture of landslide in Bavarian Alps (near Kempten, Germany, 2008). Source: personal picture

Figure 12. Rock fall in Santa Coloma (Andorra, 2008) Source: personal picture

Earthquakes

Earthquakes are "seismic movements of the solid earth caused by tectonic activities"[111].Although a large part of Europe is prone to low intensity earthquakes (mountain chains, Rhine valley), the southern parts (Italy, Greece) are threatened my a major seismic risk.

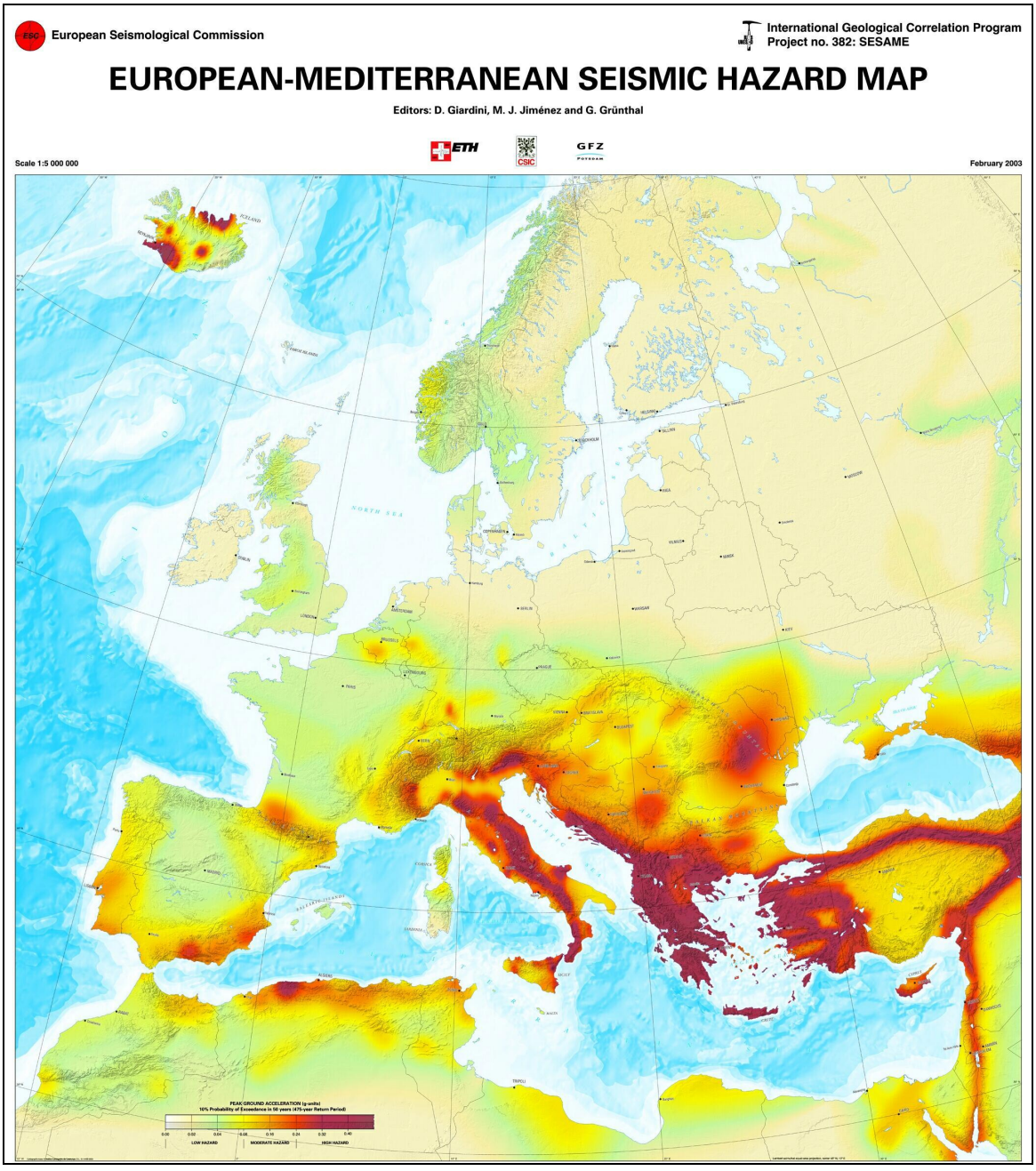


Figure 13. Map of seismicity in Europe (the map represent the peak ground acceleration for a 475 years return period. Source: Jimenez, Giardini, Grünthal 2003

111 Schmidt-Thomé, Kallio 2006

Direct effects of earthquakes concern both environment (e.g. liquefaction of ground) and structures (e.g. roads and railways, buildings). Earthquakes can trigger other natural risks such as tsunamis or landslides. Generally, it is not earthquakes themselves that cause casualties but the induced effects.

Volcanoes

A volcanic eruption is "the arrival of solid products at the earth's surface in the form of either the explosive ejection of fragmental material or the effusion of lava"[112]. Volcanic risk is very localised, in Europe it is concentrated in Greece and Italy[113].

The effects of volcanic eruption cover a large range of ejected material, from lava and lahars to ash, gases or rock blocks. Indirectly, a volcanic eruption can also cause earthquakes, landslides and floods[114].

Forest fires

Also called wild fires, they are generally initiated by humans (either accidentally or on purpose). In addition to the obvious consequences on flora and fauna, fires impact human settlements and can claim lives. Indirectly, fires can also create "favourable" conditions for other risks such as landslides or floods.

Forest fires are a serious issue in southern Europe, every year large portions of forest are burnt to ashes in Portugal, France, Italy and Greece. With a lower magnitude, this risk also exists in other parts of Europe with dense forests.

Dam breaking

This risk is categorised in between natural and technological risks. It results directly from a human activity (building dams to regulate water streams, avoid floods and/or produce energy) but its

112 Schmidt-Thomé, Kallio 2006

113 Overseas territories of European countries are much more threatened with active volcanoes in Guadeloupe, Martinique, Réunion, Canaries and Azores.

114 In Iceland, some active volcanoes are covered by glaciers. Eruptions can cause the ice cover to melt. If the amount of water cannot be contained in the caldera, floods happen. This phenomenon is called Jökulhlaup.

effects can be compared to natural phenomena (wave, submersion, release of energy) and can have the same consequences on environment and structures.
The risk of dam breaking is obviously spatially limited to the surroundings of dams (although this can extend to several dozens of kilometers), both downstream (where wave and submersion have a great destruction power) and upstream (where the sudden decrease in pressure due to the absence of water renders the banks unstable and can cause landslides)

Natural disasters in Europe

The existence of these natural risks in Europe has been acknowledged centuries ago because of past disasters. Catastrophes marked the history of Europe since the foundation of societies. Events such as the volcanic eruption of Vesuvius burying Herculaneum and Pompeii under pyroclastic material (-79, Italy), the collapsing of Mount Granier burying several villages under rocks (1248, France) or the earthquake that almost completely destroyed Lisbon (1755, Portugal) have a place in collective memory and made humans realise that they were threatened by powerful natural phenomena.

With the emergence of industrial societies, the idea that humans could control the environment and reduce natural risks gained force. Applying engineering measures seemed to be a solution to the menace that those phenomena represented. Across Europe, dikes, canals, dams were built to protect settlements.

At the same time, the development of sciences, the constant deepening of knowledge and improvement of techniques reinforced the idea that humans could tame nature.

Although these measures did reduce the impact of natural risks on the built-up environment, they did not annihilate risks. Recent events such as the l'Aquila earthquake (2009, Italy), the floods of Elbe, Danube and Vltava (2002, Czech Republic, Austria, Germany, Slovakia, Poland, Hungary, Romania and Croatia), or the heat wave of summer 2003 proved that structural measures are not sufficient against natural risks. A larger approach has been used in the last decades, with a wider spectrum of measures and actions. More comprehensive strategies were drawn and applied.

The next chapter will present how European countries deal with natural risks.

2. 2. Dealing with natural risks in Europe

As explained in the previous chapter, the existence of natural risks and the necessity of addressing them are acknowledged through Europe. In all European countries strategies to deal with natural risks have been defined. Because of the diversity of European territories and the risk situations they are confronted to, these strategies vary largely. Different paths have been explored by societies. This chapter proposes to look at these different options and try to point out what leads to the decisions.

The general idea of the process of dealing with risk can be formalised through the risk governance framework (see chapter 1.2.1). It is composed of two main elements, risk assessment and risk management, embedded in a large communication context.

Practically, societies deal with natural risks by making use of a choice of adapted tools in the large box available. Different approaches of dealing with natural risks co-exist in Europe. Basically, the history and background of each country shaped the policies and decision-making processes. Several elements participate in this differentiation:

- The institutional setting: federal countries, decentralised countries, centralised countries do not have the same approach of dealing with risk. The policies are not emanating from the same level in Germany, where the risk related issues are duty of federal Länder, and in France, where the policies are decided by national ministries;

- The chosen scale for implementation of risk management strategies: risk-related decisions can be taken at a local, regional or national level, to be adapted at different levels. A gap between decision and implementation level can lead to enforce strategies that are not fitting to the actual situation. For instance, in Switzerland the responsible level concerning decisions and implementation of policies is the canton (NUTS 3), whereas in France the ministry (national level) decides and the commune (below NUTS 3) implements. The question of interplay between the different levels has to be solved to reduce overlapping and increase efficiency. Applying the principles of subsidiarity could help reaching this objective, as it is done in Switzerland concerning response activities (they are responsibilities of the commune, if their means are not sufficient the canton can support them, and when " a national solidarity campaign is necessary"[115] the Confederation can also intervene);

115 Veyret, Meschinet de Richemond 2003, originally in French

- The focus: “some countries focus more on crisis management than on promoting a risk prevention policy”[116]. For instance, the Italian approach is mainly centred on reparation and civil protection, whereas Switzerland concentrates rather on preventive tools;

- The normative approach: the legal framework can concentrate on coercive measures or propose an inciting approach;

- The role of insurance companies and State in compensation of damages: in some countries the insurance of real estate is compulsory (e.g. France) while in most of Europe it is optional. The role of State in compensation also varies a lot, between countries where a public compensation system is positioned (e.g. Italy) and countries where only private insurance companies indemnify affected people (e.g. Germany). Insurance and reinsurance companies are therefore key actors of risk governance, with a large knowledge of disasters and their consequences.

Risk assessment

In the risk assessment phase, the objective is to evaluate the hazard(s) and the associated vulnerabilities, combining these two first steps to provide a risk analysis. Risk assessment is achieved by confronting this analysis to the risk perceptions and cultures existing on the concerned territory. After this, the acceptability of the risk(s) is judged.

Different strategies of risk assessment are applied throughout Europe. First, hazards are studied by scientists and experts. They can then provide hazard evaluation. It usually relies on a probabilistic approach, considering the frequency of occurrence of the hazard and its magnitude on a scale adapted to the phenomenon (see chapter 1.2.2).

In Switzerland a probabilistic approach is used to determine the acceptability of a risk, depending on its probability of occurrence and the expected extent of damages. Both parameters are quantified (see figure below).

If hazard evaluation relies on similar techniques across Europe, its outcomes have different uses and aims. Hazard maps can be created to give a spatial representation of the information

116 Veyret, Meschinet de Richemond 2003, originally in French

gathered. Further, “in many European countries hazard maps […] are used in territorial planning decision via zoning: “construction dispositions” in Bavaria, local plans in Switzerland”[117].

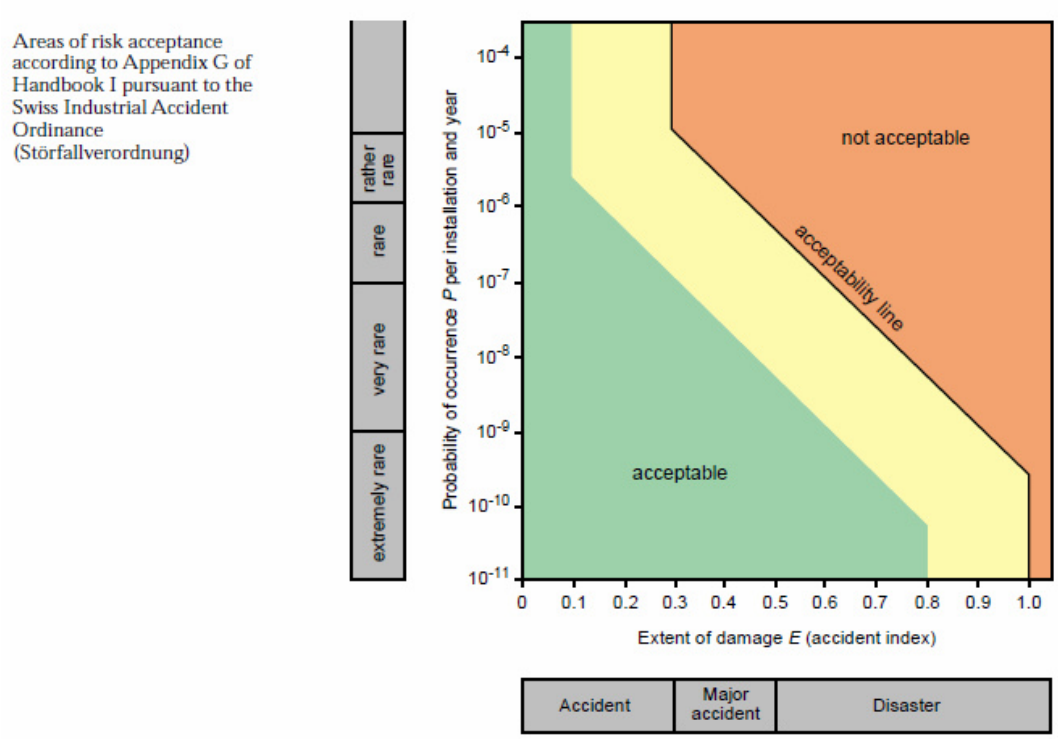


Figure 14. Swiss matrix used to determine risk acceptability

Source Hay, WBGU 2000

Risk management

In risk management also different strategies exist. The main focus of risk management can differ, For instance, Switzerland’s management strategies focus on prevention “with a focus on hazard analysis, risk evaluation, planning of measures and limitation of residual risks”[118], but the support given to victims of disasters is an old tradition.

In France there is a long tradition of structural protection measures “resulting from the ancient existence in the country of engineers competent to build dikes”[119]. In addition, a particular attention was given in the last decades to prevention, for instance with land use legislation. The risk prevention plans (PPR) were instituted in 1995 to prevent further development in dangerous areas or define restrictions applicable to risk prone zones. Certain tools can be used in different ways, for

117 Veyret, Meschinet de Richemond 2003, originally in French

118 Ibid.

119 Ibid.

instance “maps can be considered, depending on the country, as a knowledge tool and a base for legislation, or as a communication tool aiming at information and mobilising population”[120].

Where do these differences come from? Ernst[121] identifies seven axes "determining the establishment of specific logics of natural risks management":

- The conception of public interest (or good of the community): economic (e.g. in France), juridical (U.K. and Germany), environmental quality (Portugal);
- The culture of concurrency: monopolisation by eliminating potential concurrent or negotiated cooperation;
- The "top-down" and "bottom-up" approaches of governing;
- The role of nature: a resource to exploit (countries of Roman culture) or a manifestation of spirituality to be preserved (countries of Germanic and Celtic culture);
- The importance of security: "northern" European countries confer more importance to security than "southern" countries;
- Historical background and experience: previous catastrophes, risk history, and the traces they left in culture;
- The relation to future: careless, confident, or prospective.

Because of those different backgrounds and cultures, European countries have chosen or developed different approaches to "dealing with natural hazards and risks". Those approaches combine elements of the four risk management "ideal types" as defined by Weber[122]:

- political regulatory process (standard regulatory process)
- public deliberation (involving the society in the decision-making process)
- technocratic perspective (involving only experts in the decision-making process)
- economic approach (based solely on economic grounds)

120 Veyret, Meschinet de Richemond 2003, originally in French

121 Ernst 2004

122 Weber 1962

There is no perfect approach in dealing with natural hazards and risks. None of the above-mentioned approaches is ideal and fitting to every setting. It is necessary to compose a strategy with elements from all of them, taking into account the particular risk setting.

In "Risk management in post-trust societies"[123], Löfstedt identifies some crucial points to be considered when developing such an approach. In particular, he insists on the fact that a deliberative approach is not always required, depending on the situation. For instance, he would not advise to use it "in a high trust but uncertain risk situation", when it seems to be the right option in "a low public trust situation", provided that the strategy is chosen with a particular attention paid to "the reason for the distrust". Löfstedt also points out the importance of special interest groups (lobbies, NGOs, associations) especially when "the regulator is not seen as impartial". However, when this is not the case "special interest groups usually set up the public against regulators which often jeopardises the risk management process".

2. 3. Limits of the current approach

Although the question of natural risks has been seriously considered by public authorities for several decades, although important progress has been achieved with regard to prevention of disasters, European countries are still suffering severe damages. A constant effort is put on reducing vulnerability, and indeed “losses of life from natural hazards are declining [but] at the same time lossed of property are large and continue to grow”[124].

Beyond the increasing proportion of insured properties, which obviously participates in the growing cost of natural events, there might be other explanations.

The French Inter-ministerial delegation for spatial planning (DATAR) suggests that this could be due to "a lack of preventive policies, a concentration of population and activities in risky areas, spatial planning taking insufficiently account of risks, a prejudicial modification of agricultural practices, or a bad maintenance of river beds"[125].

Another track to the explanation of this lack of efficiency is the distrust in public authorities. As Löfstedt[126] pointed out, "research showed that that regulators (particularly in Europe) are trusted less and less". He mentions several factors that can explain this decline in public trust, among

123 Löfstedt 2009

124 White, Kates, Burton 2001

125 DATAR 2004, originally in French

126 Löfstedt 2009

them "higher levels of education and greater availability of information resulting in a more sceptical public" and "increased scientific pluralism leading to confusing messages", highlighting the importance of a good risk communication process.

“Although it is verified that stakes and elements at risk increase automatically with the population growth in exposed areas, the question of increase of vulnerability is more complex”[127]. Some authors go even further, like Burby who, after observing that “governments traditionally try to cope with disasters using warnings, emergency relief, and hazard reduction measures” states that “none of these usual approaches is adequate to reduce losses in disasters to acceptable levels”[128]. Others, maybe more pragmatically, consider that “no one mitigation strategy taken in isolation can guarantee disaster relisience”[129], insisting on the need of multihazard and multidisciplinary approaches.

There are certainly several factors impacting every step of the risk governance process that lead to this observed lack of efficiency.

2. 3. 1. Limits in risk assessment

In the risk society described by Beck[130] “the past lost its determining function for the present”. It is not anymore acceptable, or efficient to rely entirely on past events and experience to address future threats. New situations arise. Climate change, for instance, modifies risk settings and vulnerabilities. "Risk assessment is confronted with three major challenges that can be best described using the terms "complexity", "uncertainty" and "ambiguity" "[131].

A risk is complex when the hazards involved are potentially numerous, and linking them with a specific consequences is difficult.

A risk is uncertain when the cause-effect relations are not clearly identified, because of a lack of technical information or scientific knowledge about the hazard.

127 Vinet 2007, originally in French

128 Burby 1998

129 Berke, Smith 2009

130 Beck 2008

131 IRGC 2005

A risk is ambiguous when its evaluation generates divergent understanding, for instance when different evaluations came out with dissimilar conclusions, or when the result of risk assessment can be contested.

Complexity, uncertainty and ambiguity complicate the management of risk. “In a western environment of technical mastering, uncertainty, non familiarity and difficulties in risk evaluation can seem unbearable”. Modern risks pose new challenges for decision makers. A concept developed by WBGU, characterising risks according to their probability of occurrence and the extent of possible damages, but also considering the uncertainty linked with these elements, illustrates this very clearly.

In this classification, risks are compared to mythological stories and characters.

Risk class	Characterization P signifies the probability of occurrence and E the extent of damage.
Damocles	P is low (approaching 0) Reliability of estimation of P is high E is high (approaching infinity) Reliability of estimation of E is high
Cyclops	P is unknown Reliability of estimation of P is unknown E is high Reliability of estimation of E tends to be high
Pythia	P is unknown Reliability of estimation of P is unknown E is unknown (potentially high) Reliability of estimation of E is unknown
Pandora	P is unknown Reliability of estimation of P is unknown E is unknown (only assumptions) Reliability of estimation of E is unknown Persistence is high (several generations)
Cassandra	P tends to be high Reliability of estimation of P tends to be low E tends to be high Reliability of estimation of E tends to be high Long delay of consequences
Medusa	P tends to be low Reliability of estimation of P tends to be low E tends to be low (exposure high) Reliability of estimation of E tends to be high Mobilization potential is high

Figure 15. WBGU Classification of risks

Source: Hay, WBGU 2000

This classification is also represented graphically, surimposed on the acceptability graph.

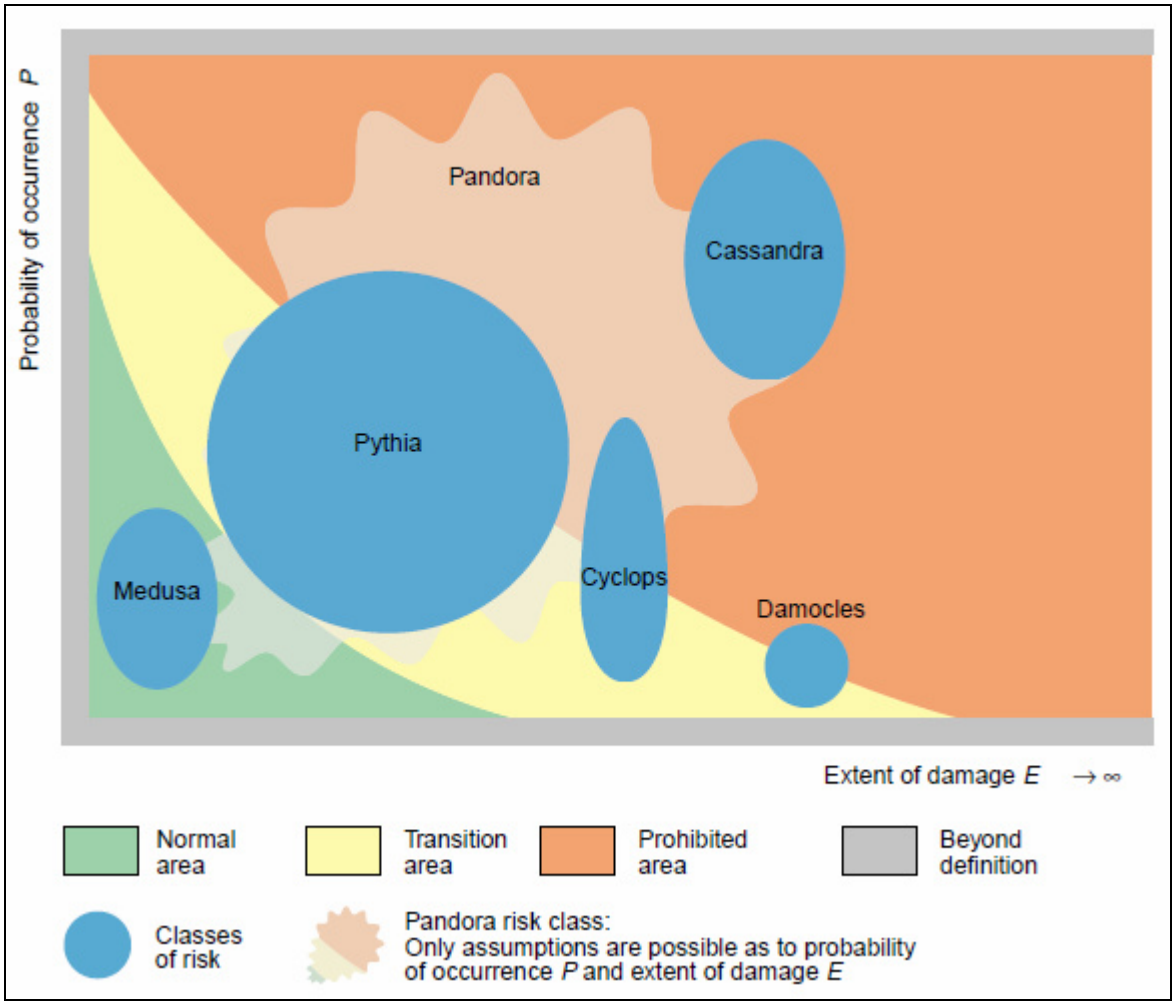


Figure 16. Classes of risk and their location in the normal, transition and prohibited area

Source: Hay, WBGU 2000

Associated with theses classes, WBGU suggests risk management strategies and tools aiming at "shifting risks from prohibited or transition area into the normal area"[132].

Another possible explanation why risk assessment methods reached their limits lies in the political character of risk pressing constraints on the decision making process. Elements external to the actual risk setting also enter the discussion (e.g. the need to satisfy electors, pressure of lobbies, coming elections). These "political and institutional constraints on risk management are poorly taken into account"[133].

132 Hay, WBGU 2000

133 Veyret 2003, originally in French

On another level, these political aspects are not always known to other actors. In particular, experts and scientists might believe that the information and data they produce will find a place in the decision maklnng process. “The assumption that risk information would be used to alter development patterns is a typical perspective of physical scientists” who ignore or forget that “politicians respond to a broader decision making framework, which includes time frames bounded by limited electoral terms and economic drivers”[134].

2. 3. 2. Limits in risk management

As seen earlier in this study (see chapter 1.2.1), a crucial element of “good risk governance” is the existence of mutual trust among all involved parties (decision makers, stakeholders, population). This poses serious problems in post-trust societies, as described by Löfstedt[135]. The TRUSTNET experts observe that “the traditional approaches to risk governance do not encounter public suport, and in consequence the government’s mandate and legitimacy is in some way questioned. Such a situation leads to loss of public confidence and social distrust”[136].

This lack of trust is reinforced by the feeling to be left aside of decision making processes. The technocratic perspective on governance is still largely present in Europe: experts see themselves as “delegated agents of lay citizens who lack time, expertise, resources and cognitive capacity to make complex risk management decisions” and, as such, consider that risk management should “be left to the elites / experts advising government ministers and policy makers with minimal or no public involvement”[137].

Experts and decision makers sometimes refuse to take seriously the concerns of potentially affected persons, “claiming that the latter are irrational”. When this happens “technical risk assessment is frequently declared the sole valid perspective”[138]. Löfstedt describes this smothering role of experts as an “expertocracy”.

Indeed “citizens are more often perceived as potential victims than as actual actors”[139]. Another factor impeding efficiency of mitigation policies is the tendency of populations to rely on the authorities. As Burby explains, “if they believe someone else will pick up the tab, individuals and

134 Etkin 2009

135 Löfstedt 2009

136 TRUSTNET 1999

137 Löfstedt 2009

138 Hay, WBGU 2000

139 Veyret 2003, originally in French

communities may not be willing to take the steps necessary to reduce their own vulnerability"[140]. Ultimately, this led in some countries to a paradoxical situation where, although the population shows defiance towards authorities and decision makers, people rely on them and "discharge their responsibilities regarding possible crisis to the State and do not feel concerned by prevention"[141].
On another plan, the mitigation measures can have limits. "The current hazards reduction policy consisting in studying a problem, then setting up solutions before addresing the next question leads to favouring technical solutions and structural measures"[142] when a multihazard approach also requires a large part of non structural ones. But structural measures might present a limited efficiency because of design flaws. For instance, the materials and techniques used to build them can turn out to be unadapted, or the grounds on which they have been built can be too unstable.[143] Paradoxically, the efficience of structural measures can increase vulnerability. "Because people do not understand that structural protection has limits, structures have been found to actually induce development in hazardous areas"[144].

2. 3. 3. Limits in risk communication

The advantages of good communication between actors of risk governance are numerous. By sharing information, concerns, expectations, the different group involved understand each other better. This contributes to an atmosphere of mutual trust where decisions, if not always accepted, are understood and applied, comprehension and acceptance being different processes.[145]

Unfortunately, in many cases "risk communication became one way communication, where experts and decision makers transferred information to the public in order to help them understand the decision"[146] that was already taken.

The crucial role of mass media in the process of risk communication is not exempt from critics.

"Although catastrophes are complex, the media model follows a simple scheme of cause and effect"[147]. In the United States, a unique pattern has been identified: first "media show interest for visible effects [of a disaster], then they search for a reponsible, that will of course be opposed to

140 Burby 1998
141 Ibid.
142 Veyret 2003, originally in French
143 Hay, WBGU 2000
144 Burby 1998
145 Hay, WBGU 2000
146 TRUSTNET 1999
147 Dauphiné 2003, originally in French

the rescuers heroes"[148]. This simple manichean vision of disasters tends to blur the message sent to the population. By focusing on some aspects, and totally neglecting others (e.g. prevention measures, or what worked in protection) media orientate debates on reponsibilities of authorities, completely forgetting to discuss the responsibilities of individuals. This maintains a climate of defiance towards authorities.

"Many impediments prevent authorities from communicating with the public in ways that succeed in getting people to prepare"[149], for instance uncertainty in the message (although for scientists uncertainty is part of the information) or source credibility.

In a time of extensive availability of information, when everything can be known and accessed at any time, "risk information must compete for attention with numerous other types of information".[150] In addition, the increased mobility of population participated in increasing vulnerability. Local history as always been an important part of risk knowledge and perception. But within modern populations, people who "often move to new locations and are also very mobile for their leisures often ignore the hazards that can threaten them"[151].

2. 4. Building an Europe of natural risks

Discussing the different approaches to natural hazards and risks across Europe leads to the controversial question of a standardised approach. In a general dynamic of European harmonisation of policies on many topics, the question of an harmonisation of risk governance policies can be posed.

This idea is supported by the fact that risks know no borders. They can affect large areas covering territories in different countries. Administrative limits are not relevant when dealing with natural phenomena, and concerted risk management strategies are clearly of interest in these areas.

Moreover, several countries in Europe are affected by similar risks and hazards. As the French maxim says "l'union fait la force". Together European countries are stronger. "In order to improve our capacity to manage risks, we now need to learn to share our experiences, understand what is done beyond our borders, open up cultures"[152].

148 Dauphiné 2003, originally in French

149 Tierney, Lindell, Perry 2001

150 Ibid.

151 Veyret 2003, originally in French

152 Ibid.

Many international initiatives have been taken around the question of risks. The most important are the conventions and conferences, in which many countries affirm their will to deal with risk in an acceptable and sustainable way. Unfortunately, those declarations are not binding, and the nice discourses are not always followed by actual changes.

After the United Nations' International Decade for Natural Disaster Reduction, many projects have been developed around the world.
What role can the European Union play in this frame? Veyret wishes that European countries would aim at “normalisation of risk maps, information, monitoring, at least using the same methods”. The interest of harmonisation of methods and objectives is already recognised by European authorities, the European Commission is strongly supporting such initiatives, for instance via transnational cooperation, a way to broaden knowledge by learning from the experience of other countries. Texts such as the flood directive, the territorial agenda, or the ESDP already go in this direction. In the territorial agenda adopted in 2007, Member States affirm the importance of transnational approaches.

> In order to improve the efficiency of risk management activity and to guide development appropriately, integrated trans-European and crossborder strategies (e.g. flood protection, drought and desertification prevention, integrated coastal zones and mountainous areas management, technological hazard management, improved forecasting), should be adopted, in cooperation with our neighbouring countries, and mew forms of risk governance arrangements should be developed, especially in multi-hazardous areas like coastal zones, lakesides, maritime and river basin and mountainous areas. [153]

Independently from the European Institutions, multinational networks such as CIPRA (Commission Internationale pour la Protection des Alpes, International Commission for Protection of the Alps) support initiatives, for instance the "Future in the Alps" project.

But “this approach, as useful as it is, poses problems, the first one being that languages used, but also political and administrative frameworks are too different to allow a satisfying understanding of risk management in foreign countries”[154].

153 Territorial agenda 2007

154 Peltier 2005, originally in French

The existence of various risk cultures within Europe is a clear obstacle to common strategies.

Risk cultures

As shown in the previous chapter, when confronted to natural risks European countries adopt different strategies. Even when the situations they have to deal with are similar, the paths chosen diverge. “To understand the ways in which risks are dealt with, it is essential to take into consideration the sociocultural setting. This means not only rough distinction according to “Western” and “Eastern” cultures, different religions or nations. Disparate social representations (subcultures, group-specific knowledge) can prevail in various groups within, for instance, Western culture or a nation”[155].

These risk cultures are created by the specific context in which the risk exists. They encompass factors such as the administrative and legislative framework, geographical context, sociodemographics, economic activities, and are influenced by events, choices and decisions, history, local vernacular knowledge.

Interestingly, the relation between risk cultures and risk management strategies is dual: cultures influence the decision making, and the decision taken and strategies applied participate in shaping risk cultures.

From a planner perspective, risk cultures are also influenced by planning cultures. Planning strategies vary across Europe. Janin Rivolin distinguishes two planning system models:

- A conforming one, in which “the plan is intended to be a binding public strategy, to be achieved by assigning rules that are expected to be followed in public and private project implementation”;

- A performing one, in which “the plan is developed as a not-binding public strategy, the power of which is political and not judicial. Rules are assigned for implementing those public and private projects that are capable of contributing to the public strategy”[156].

155 Hay, WBGU 2000

156 Janin Rivolin 2008

In addition “legal and administrative families” can be identified in Europe, with countries sharing similar legal and administrative frameworks. These similarities are inherited from history. Newmann & Thornley recognise four of them:

- “The Germanic legal family, in which the division of powers and responsibilities between different levels of governments are established in the written constitution. The comprehensive codification of law results in a planning system characterised by rigorously formulated planning regulations. The strong constitution and the federal system of countries belonging to the Germanic legal family contribute to a strong regional level of planning which results in considerable variation in the planning process between regions but within a strong national framework.
- The Napoleonic legal family, in which local administration is mainly based on the local commune and the number of local authorities is often large. Local authorities traditionally were branches of the central government, and the degree of centralization has traditionally been high. This style of planning is dominant in most Mediterranean countries. Development is regulated by means of rigid zoning and codes.

- The British legal family, that evolved from the tradition of English Common Law, a system of case law that has gradually been built up decision by decision. There is an empirical slant to this approach and an emphasis on past experience and precedent. The British legal approach considers local authorities as the deliverers of services within a framework set and controlled by central government.

- The Scandinavian approach, which has similarities with both the Napoleonic and the Germanic styles (particularly the latter) but is arguably more pragmatic. A central characteristic is that local government is considered as a cornerstone of the constitution. The strong relationships between national and sub-national government bear similarities to the Napoleonic family while the high degree of decentralisation and the long history of local government links them to the Germanic family.”

These frames shaped the approaches to risk governance in European countries. Decision makers at every level conform to them unconsciously. Risk cultures and planning cultures are important elements of risk settings. They should not be discarded in decision making processes.

2. 5. Research questions

After a review of existing literature on risk governance and natural hazards, it appears that the role of the public is crucial, but largely underestimated by decision makers and stakeholders. In an attempt to understand better how populations can be involved in risk governance processes, the empirical part of this study has been focused on people living with risks. The research hypotheses presented earlier can now be translated into guiding questions to be investigated.

Hypothesis 1. Trust in decision makers is an issue in natural risks management, and a deeper involvement of all stakeholders groups in the decision making process could help rebuild trust.

- Do populations trust decision makers?
- Are populations interested in participating in decision-making processes?
- Can the involvement of the public in decision making processes help rebuild trust in authorities?

Hypothesis 2. Because of the existence of different risk cultures and risk perceptions, transferring practices and strategies from a setting to another is complex. Elements that need adaptation could be identified beforehand to facilitate sharing methods among regions or countries.

- Ho can the transfer of practices and strategies poses problems?
- Which elements of risk culture should be considered to improve transferability?
- How can individual risk perceptions be taken into account?

3. Comparative case studies in the Alps

The topic of this study called for an empirical approach. Obviously, it made sense to address the questions of local risk governance strategies, risk cultures and risk perceptions on the field. This allowed to stay in line with the reality of risk governance, and to have first hand access to the concerns and expectations of all stakeholders groups. Therefore, it was clear from the initiation of this study that a large part of the work would take place “on the field”.

After a short introduction to the methodology applied, the geographical context of this study will be presented. The case study and its results will then be developed.

3. 1. Methodology

The use of case studies comparison appeared to be the best way to proceed. By conducting the same work in different sites presenting similar risk settings, it became possible to point out the similarities and differences in the way risk related issues are addressed in different contexts, revealing different risk cultures.[157] This was then used to identify relevant factors in risk management policies and decision making, which had to be taken into account when shaping the proposed concept of risk governance building.

After the review of existing literature about risk governance, the decision to focus the study on risk perception of the population was taken. Indeed, if scientific literature already provides many studies on factors of risk cultures such as administrative and legislative framework, relation to past events or general relation towards authorities, the topic of individual risk perception is less often addressed. In addition, when it is considered it often remains a scientific work and is not put in use for local decision making. In this study, a particular interest was given on how collected data could be useful to local populations, stakeholders and decision makers, and not only for scientists. It was clear from the start that the results would be presented and explained to local communities.

In order to obtain comparable data on different sites it was decided to apply a survey based on a questionnaire. Before the preparation of questions, informal dialogue with local stakeholders, decision makers, experts and scientists involved on the field took place to help understanding the local specificities. This allowed a focus of the questions on actual concerns and needs of stakeholders groups.

The study took place in a particular geographical environment: the Alps.

157 The criteria for selecting the case study sites, and the selected sites are presented in chapter 3.3.1

3. 2. Geographical context

3. 2. 1. Mountains

Mountains are a singular milieu. They always fascinated men, both for the beauty of their landscapes and for the fear they inspire. They emit an impression of dormant forces, that can devastate entire regions when they come out.

Mountains present the specificity of being a "three-dimension world"[158], where the height acquires a special importance. Intimately linked with this new axis, the notion of slope is very important in the understanding of mountain areas. Everything in mountains is bound with this particular element: climate, occupation, activities… and hazards.

Mountains present a specific climate "characterised by an exacerbation of elements"[159]. Temperatures are colder, and particular mechanisms such as thermic inversion can be observed. The rainfalls are more important than in plains, and can provide snow. The winds have a particular importance in this context, and phenomena like the Foehn are typical from mountains. Finally, the cold climate implies specific conditions, such as frost.

In spite of those hard climatic conditions, mountains have always been occupied by men. Traditionally, they were isolated spaces devoted to agriculture and breeding. In the 19th century, industry developed in valleys, using their advantageous situation of preferential transport path across mountains and the proximity of rivers. The development of mass tourism changed this situation. Nowadays mountains have two different activities: a working space, with industry and traditional agriculture, and a recreational space, devoted to tourism, mainly in winter (ski resorts) and increasingly in summer (green tourism).

All those human activities have deeply marked the mountains. Deforestation, excavation, slope cutting, unpermeabilisation of soils have strong consequences on the behaviour of elements in this environment. In particular, they influence the existing natural hazards. This important role of “domino effects” (also called cascading effects) is very characteristic of mountains, where different types of risk interact and intertwine, rendering multihazard approaches necessary.

158 Rougier 2004, originally in French

159 Ibid.

Mountains are a challenging environment for spatial planning. Reduced accessibility forces transport planners to apply heavy structural works (e.g. bridges and tunnels) to allow mobility and to protect important roads and railways, some of them being the only connection to isolated communities.

3. 2. 2. The Alps

At the crossroad of the most densely populated regions of Europe, the Alps are special among the special milieu of mountains. The hindrance that they could have been forming, in the middle of the European space, has been tamed. Many important communication routes pass through the Alps, either using the network of valleys or digging tunnels under massifs.

“The urbanisation of the Alps translated into an occupation of lower valleys that concentrate most of the settlements and activities”[160]. In addition, “in many regions agricultural activities were replaced by tourism activities”[161], such as ski resorts.

The Alps are shared by many countries, from France in the west, to Slovenia and Austria for the eastern part, through Switzerland, Germany and Italy. Facing similar issues, those countries try to develop transnational cooperation, for instance via networks like the CIPRA (International commission for the protection of Alps).

3. 2. 3. Natural hazards and risks in the Alps

The Alps present particular risks “partly related to the magnitude of hazards happening in this high mountain milieu. But they are even more a consequence of the increasing vulnerability of always growing populations, in particular because of the role of the Alps as both a recreational area and a zone of transit between the most populated and active regions of Europe”[162].

In mountains, "dangers and risks are intimately bound with a range of morphodynamic processes that, because of the relief, take an unequal extent"[163]. Natural hazards existing in mountains are strongly influenced by the particular milieu and its components.

160 Deshaies 2003, originally in French

161 Ibid.

162 Ibid.

163 Rougier 2004, originally in French

The first hazard associated to the Alps, and the more frequent disaster type, is snow avalanche. The snow cover accumulates in layers. Suddenly, the upper layer breaks out and an important volume of snow is released, running on the slopes with a very high velocity (sometimes more than 200 km/h). The consequences of avalanches are worsened by the air blow, a choc wave with a strong destruction potential. The triggering effects of avalanches are not fully understood, but the forecasting methods are improving. Every year more than 1200 snow avalanches are recorded in Switzerland only[164].

Landslides affect many slopes in the Alps. Under the action of gravity, they can displace huge volumes of material (up to several million of cubic metres), sometimes a whole slope of the mountain. They are deeply studied, some of them are monitored (e.g. La Clapière, France). Those phenomena can be particularly devastating, burying entire villages under tons of rock and earth (e.g. Mount Granier, France, 1248). They can be triggered by rain, or tectonic activity, as well as by human activities and modifications of the environment (for instance after removal of material at the foot of a slope). They can lead to "domino effects" that reverberate far away from the original event (e.g. creating a natural dam, which breaks and provokes a submersion wave lower in the valley). Landslides can take many forms. Mountains in general, and the Alps in particular, are prone to mud and debris flows. Moving important volumes of material downslope with a high velocity, their destruction potential is very important. Mud and debris flows look similar to torrential watercourse when they happen. The mechanisms underlying them are not fully understood yet, especially concerning their release and their sudden stop.

Rock falls, although not typical from mountains (they can also happen in lower relief if a slope is steep) constitute a particular danger in the Alps. Due to erosion and extreme climatic conditions (alternation of hot and cold temperatures, strong wind, frost and thaw alternation) rocks simply detach from the mountain and roll downslope. When they reach human settlements they can have disastrous effects. In isolated valleys, rock falls can impact roads and block all access to certain communities.

Alpine valleys are highly exposed to flood risk, especially because the energy of the relief favours a rapid surface runoff of (sometimes very intense) precipitations, and therefore a rapid concentration of waters"[165]. Floods can be triggered by the melting of snow and glaciers. The Alps also present many debris flow prone areas, where material can be mobilised and form a stream which behaves

164 Deshaies 2003, originally in French

165 Ibid.

like water. Mountainous floods can have consequences lower in valleys, for instance when a large quantity of water released with high debit reaches flatter areas.

The Alps being “a portion of Earth’s crust that keeps lifting up at a rapid pace (1 to 3 mm per year on average)”[166] they are prone to earthquakes. Although no large damaging earthquake has been observed recently, the risk exists and quakes of low intensity are recorded regularly.

3. 3. Selection of the case study sites

3. 3. 1. Criteria applied for choice

It has been decided to select case study sites located in European mountainous areas, and more specifically in the Alps. The central position of this massif lends it a particular position in Europe. In addition to its crossroad situation (many roads and railways cross the Alps, linking the different parts of Europe), it is a highly attractive recreation area, all year long. Although the winter activities have long been the major attraction, the tourism industry has developed new products for the rest of the year. The Alps are densely inhabited, with 15 million people across several countries. Thus, natural hazards in mountains meet both economic and human stakes.

Several criteria were applied to choose the case study sites. First, it was important to have sites located in different countries, so as to compare the risk cultures. The type of risk management applied, as well as the orientation of policies, was also to be considered. According to these first criteria, it was decided to select sites in France and in Italy. Those two countries present dissimilar organisation (France is centralised, Italy is more "regionalised"), and their approach towards natural hazards is not the same: when French policies focus on preventive planning, Italian ones pay more attention to crisis management and civil protection when disasters occur.

The second criterion was the scale of the case study sites. It was decided to work on the local scale, the more appropriate for risk management decisions. Nevertheless, the "communal" scale was not fitting: in the selected countries, those units are relatively small. It was more relevant to aim at the level just above, that is the communities. It is common that small towns and villages in an area work together for issues that concern them all. They often do so for economic reasons (sharing the cost of a service is cheaper). Nevertheless, for some specific issues it is just logical to think on a larger scale than the administrative boundaries of the commune. For instance, an employment basin is usually composed of several towns or villages, with one main pole. Another

166 Deshaies 2003, originally in French

question that asks for joint efforts is the management of rivers. It is now commonly understood that the arrangement of river banks, and more generally the decisions concerning rivers, should not be considered in segments, every commune aiming at a different purpose. In Italy like in France, groups of communes are recognised as an additional administrative level.
The third criterion we applied to choose the case study sites was the situation concerning natural hazards. Mountains present various types of phenomenon that can produce risks. It seemed particularly interesting to consider sites where several risks were observed. Thus, it would be possible to point out the different methodologies and practices, answering to different processes. In order to keep the comparability of the cases, the chosen sites were threatened by both hydrological (i.e. floods) and geomorphological (i.e. landslides) hazards. The case of avalanches was deliberately left aside, as it is has been taken into account since many years, and is very well known and documented. Management of avalanches belongs to the routine of mountain resorts, and although there are still areas of uncertainty concerning the process itself, it is not as problematic as for other phenomena.

The fourth criterion was concerning the event history of the sites. It has been decided to focus on places that had experienced natural disasters recently (within the last years) and were at the time threatened. Thus, it was possible to observe how the awareness of the risk evolves, and how the past events are transcribed in the collective memory.

Finally, the sites were selected where a dynamic of research and scientific work already existed, and the local decision-makers were in contact with the scientific community. It is rather complicated to ignite such a dynamic, therefore it seemed more appropriate to benefit from an existing good context.

Based on this, study sites were selected in France and Italy. Two communities with similar risks of landslides, debris flows and floods already known with events occurring in the last centuries and more recently in the 2000s, and a background of seismic risk without any significant event in recent history. As this research took place in the frame of a European initiative building a network of scientists about mountain risks, the sites were also known to host a dense scientific community for years. In addition, both were already presenting a dynamic of risk management.

The case study sites selected were the Barcelonnette basin in southern France, and the Valtellina in Italy. The following chapter will present them.

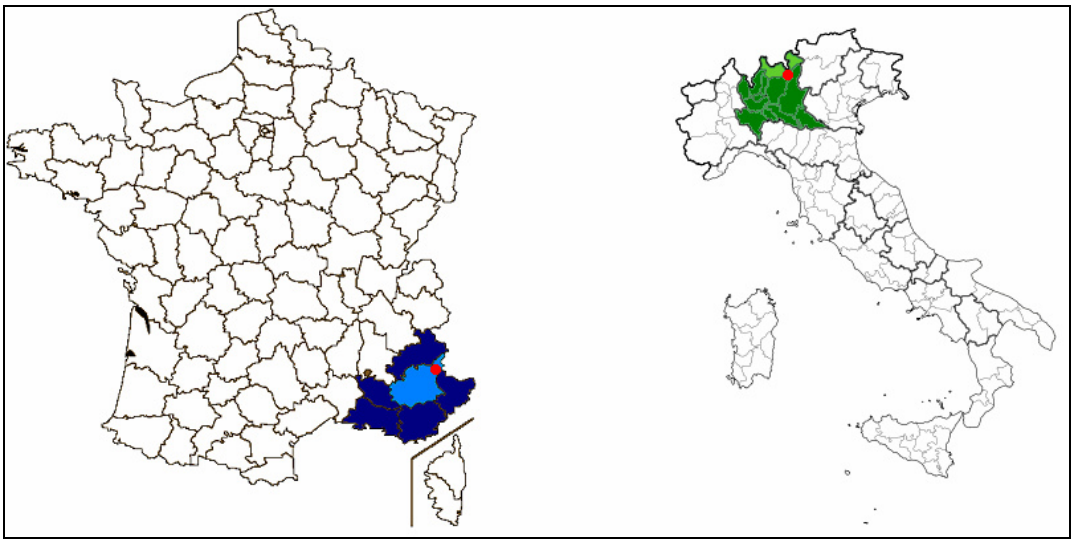


Figure 17.Maps indicating the position of the case study sites

Source: own elaboration

3. 3. 2. Barcelonnette basin[167]

The Barcelonnette basin is located in the southern French Alps. It is a part of the Ubaye valley, between its spring in the lake Longet (on the border between Italy and France) and the confluence with the Durance River, in the lake of Serre-Ponçon. The Ubaye River presents a torrential character that leads to very impressive floods, causing important damages to the villages located in the valley. Moreover, the presence of several torrents on the right bank of the river creates additional risks of floods, mud flows and debris flows.

Historically, the Barcelonnette basin belongs to France since 1713 and the signature of the treaty of Utrecht. Before this, it had been in the county of Provence, and became a duchy part of Savoy in the 14th century. Nowadays, the Barcelonnette basin administratively corresponds to the community called "communauté de communes de la vallée de l'Ubaye", which counts 14 communes[168]. This community is located in the département of Alpes de Haute Provence, in the région Provence Alpes Côte d'Azur[169].

167 The description of the case study sites is partly derived from the presentation of the case studies of the Mountain Risks project, available on the project's website: http://mountain-risks.eu

168 Communauté de Communes de la Vallée de l'Ubaye: Barcelonnette, La Condamine-Châtelard, Enchastrayes, Faucon de Barcelonnette, Jausiers, Larche, Le Lauzet-Ubaye, Méolans-Revel, Meyronnes, Pontis, Saint Paul sur Ubaye, Saint Pons, Les Thuiles, Uvernet-Fours.

169 Administratively, France is divided in 26 régions (22 in metropolitan France, 4 for overseas), each composed of several departments. There are 96 départements in France. In the NUTS classification, regions are NUTS 2 and departments NUTS 3.

The Barcelonnette Basin counts 7 700 inhabitants [170].The main commune is Barcelonnette, with more than 3 000 inhabitants. The population of the basin has been decreasing for centuries. It was reported to be 18 000 inhabitants when the area was annexed by France in the 18th century.

The area is mainly covered by forests. The progressive abandon of agricultural activities is to be taken into account as it creates gullies on slopes, increasing the risk of landslides.

The main economic activity is the tourism industry. The Barcelonnette basin is an attractive recreation area, welcoming tourists from all Europe. The so called "green tourism" has become the main axe of development. Traditional products of the region are also an important activity, linked with tourism. The quality and authenticity of hand-made specialities assures a consequent income to local population.

Regarding natural hazards, the studied area presents various slope movements (landslides, mudslides, debris flows) and floods (on the Ubaye River and on the torrents). A recent inventory of observed landslides came up with a total of almost 400 landslides, and 3 large slow-moving mudslides (La Valette, Super Sauze and Poche). On the 26 torrents known to be prone to debris-flow activity, 470 torrential floods and 100 debris flows have been recorded since 1850. The main torrents are Riou-Bourdoux, Sanières and Faucon.

In recent years, the Barcelonnette basin has suffered floods of the Ubaye River (in 2008). Two important debris flows occurred on the Faucon torrent (south facing slope) in 1996 and 2003, causing damages to several houses and infrastructure. The torrent is investigated with geomorphology, hydrogeology, geotechnics, rheology and modelling. A vast mudslide occurred in 1986 in La Valette (locality between Barcelonnette and St Pons), and is still ongoing. Nevertheless, the mitigation measures deployed since 10 years achieve a consequent slowing of the movement.

In addition, a mudslide has been triggered in the mid-50s in Super Sauze, threatening the village and the ski resort downslope. It doesn't reach any inhabited zone yet, but it is expected to flow down within the next 20 years. This particular zone is being investigated by several teams of scientists, using different techniques such as geodesy and photogrammetry, geomorphology, hydrogeology, geotechnics, geophysics, rheology or modelling.

170 Insee 1999

In the community, land use plans are developed in order to reduce the impact of natural hazards. Barcelonnette recently updated its Risk Prevention Plan (Plan de Prévention des Risques, PPR), and the other communes also take the different hazards into account in their development plans.

3. 3. 3. Valtellina

The area selected for the Italian case study is the community "Communità Montana Valtellina di Tirano", counting 12 communes[171], in Central Italian Alps. It is located next to the Swiss border. The zone corresponds to the upper drainage of the Adda River.

The Valtellina has always been a strategic point of passage, and was disputed by several countries during centuries. It belongs to the duchy of Milan since the 14th century, but the French and Spanish kingdoms and the Austrian Empire attempted to take it on several occasions. Finally, it was attached to the Kingdom of Sardinia in 1859, just before the unification of Italy on 1861. Nowadays the Valtellina is part of the province of Sondrio, in the regione Lombardy[172].
The community's population in 2001 was almost 30 000 inhabitants[173]. The main commune is Tirano, with more than 9 000 inhabitants.

The economic activity comprises handcraft and traditional alimentary products. The Valtellina is also famous for its wine production. As is many mountain massifs, tourism activity is an important part of the economy.

Regarding natural hazards, the area is prone to floods from the Adda River and its affluent, and to different types of landslides. In recent years, the Valtellina had to cope with several serious events. In November 2002, heavy prolonged rainfall caused many landslides to occur. A field survey realised at this time censed 260 landslides. In Tresenda in particular, a mudslide caused the evacuation of the population. In July 2008, strong precipitation caused floods and landslides in the region. In Selvetta one house was destroyed by a debris flow, 5 other were damaged, and the road was blocked near Berbeno.

The area is sadly famous for the rock avalanche of Val Pola[174], in July 1987, which claimed 27 lives. The massive detachment of blocks (40 millions cubic meters) occurred after heavy and

171 Communità Montana Vatellina di Tirnao: Aprica, Bianzone, Grosio, Grosotto, Lovero, Mazzo di Valtellina, Sernio, Teglio, Tirano, Tovo di S. Agata, Vervio, Villa di Tirano.

172 Italy is administratively divided in 20 regioni (NUTS 2), themselves divided in provincie (NUTS 3). There are 110 provincie in Italy.

173 ISTAT 2001

prolonged rainfalls, coupled with high temperatures. There were also many debris flows and fluvial erosion processes which caused severe damages but no casualty, because the monitoring of the area by geoscientists had allowed an early warning, and people were evacuated from the area.
In Valtellina the authority collaborated with University of Milan to settle a GIS-based system designed to support them in the crisis management. The platform, named PETer (Protezione Emergenza Territorio, Protection for Territorial Emergencies) gathers all relevant information, and allows organising step by step the process to be followed in case of disaster.

3. 4. Field work

3. 4. 1. Methodology

First, a short review of existing literature and data available about both sites was performed. Directly after, contact was established (with the support of scientists working on these sites) with local stakeholders and decision makers. At that point discussion remained informal, and aimed at obtaining a better understanding of local specificities.

Based on these informal meetings and after discussion with scientists and research teams working on the same area, it was decided to study the population's perceptions and expectations by use of a statistical survey. The topics to be addressed by the survey were also selected: knowledge and information about risks, perception of danger associated to natural hazards, perception of the actors involved in risk governance, expectations towards communication in the frame of the risk governance process.

The choice of a questionnaire base survey answered to practical needs: the survey had to be carried in two areas in a rather short time, and interviews (even semi-directed) would have required a long analyse. In addition, many interesting aspects of open questions were here annulated by the fact that the survey would be conducted in two countries speaking different languages: it would have been impossible to compare terminologies used in answers.

174 Val Pola is located in the Valtellina, but not within the boundaries of the Community

3. 4. 2. The questionnaire

The questionnaire was designed in collaboration with two other research teams[175] studying other aspects of risk perceptions in the same areas. Following the idea that one unified questionnaire would be more appealing to inhabitants of the area than three different questionnaires addressing related issues, it was decided to create a joint set of questions. Each team would then use the data its study required.

In order to avoid translation issues, the questions were mainly close-ended (a choice of answers was provided). Nevertheless, it was possible to comment on the whole questionnaire and some interesting remarks have actually been noted.

After testing a first draft and correcting it, the final questionnaire was edited.

In order to try to identify patterns of answers, questions were cross analysed with the age and gender of respondents, as well as with other factors (previous experience with natural disasters, ancientness in the community).

The questionnaires were anonymous in order to encourage honest answers. They have been spread among the population using different ways: in France they were distributed by the Post services to every household, in Italy they were distributed in schools (to pupils to forward to their parents) and to key persons in the community who helped distributing to others[176].

3. 4. 3. Results of the survey

Before starting with the presentation of results, it is important to keep in mind that the answers analysed hereafter are provided only by people who felt enough interest for the topic to spend time on the questionnaire. The results presented here should be understood as “the perceptions and expectations of people who answered” and not as “the perceptions and expectations of inhabitants of Ubaye and Valtellina”.

175 The main contributors were Carolina Garcia Londoño from University of Milano Bicocca and Melanie Kappes of University of Vienna, both also part of the Mountain Risks network.

176 It has not been possible to simply distribute the questionnaires like in France. Therefore a more complicated way to reach a wide sample of the population had to be used.

Who answered?

These first questions had two goals. First, they allowed cross-analysis on other questions, in order to determine patterns according to groups (men / women, younger / older). They also provided precious information allowing comparisons between the respondents sample and the actual population of the case study sites (census data were used for this aspect).

The following graphics show, for each site, a comparison between the age pyramid and the distribution of the sample.

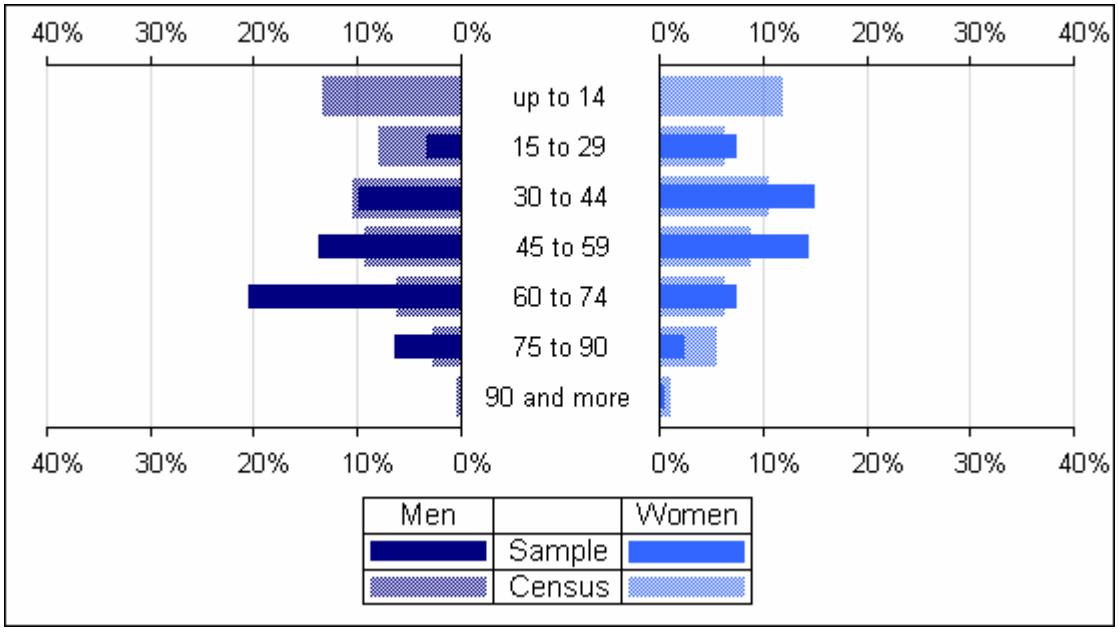


Figure 18. Distribution of gender and age of respondents for the Ubaye case study

On the Ubaye respondents, an important over-representation of elder men can be observed in the sample, and was attributed to the “grandpa effect”: “as grandfathers enjoy sharing their knowledge and stories with their grandchildren, they seemed to enjoy sharing their knowledge about natural hazards in their region with interested people”[177]. This was moreover confirmed on the field. A less pronounced over-representation of women is also noticeable. It as been shown by many studies that women tend to be more concerned about risks (and this is confirmed on this sample by further questions), this might be an explanation. Consequently, other categories are under-represented: younger men and elder women.

177 Angignard, Greiving, 2010

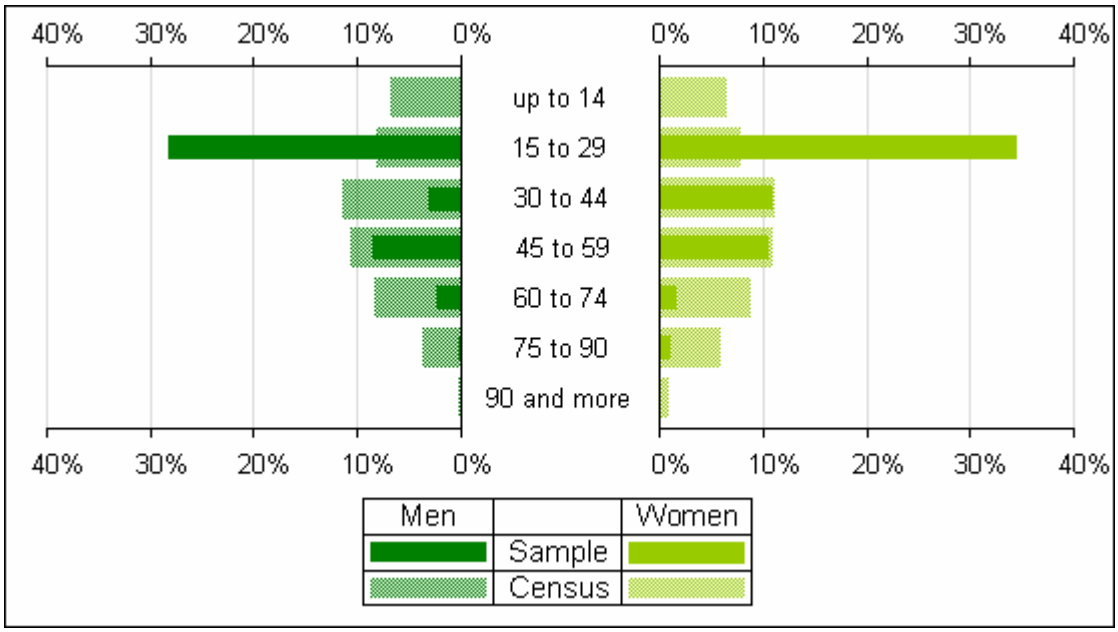


Figure 19. Distribution of gender and age for respondents in the Valtellina case study

On the Valtellina respondents, a clear over-representation of younger people is observed. This is due to the method used to spread the questionnaire in the community. By starting from schools (and passing the questionnaire to some students), the survey reached mainly households with young parents, and by networking their friends and relatives. Consequently, other categories are under-represented.

Considering the differences between samples and censuses, the question of sample correction was posed. The number of answers (344 for Ubaye and 483 for Valtellina) did not permit a reasonable correction of the samples. It was decided to analyse the answers in their original distribution instead of affecting coefficients to each group. Although this does not provide a comprehensive view of the entire population's opinion, it gives an interesting insight.

The next question was about the ancientness of settlement of the respondents in the valley This information seemed crucial: newcomers are likely to know less about the area and its risks and disaster history. It could also be expected that families which are installed in the same area for several generations benefit from a transmission of information between generations. Therefore, the ancientness was evaluated both in years and in generations.

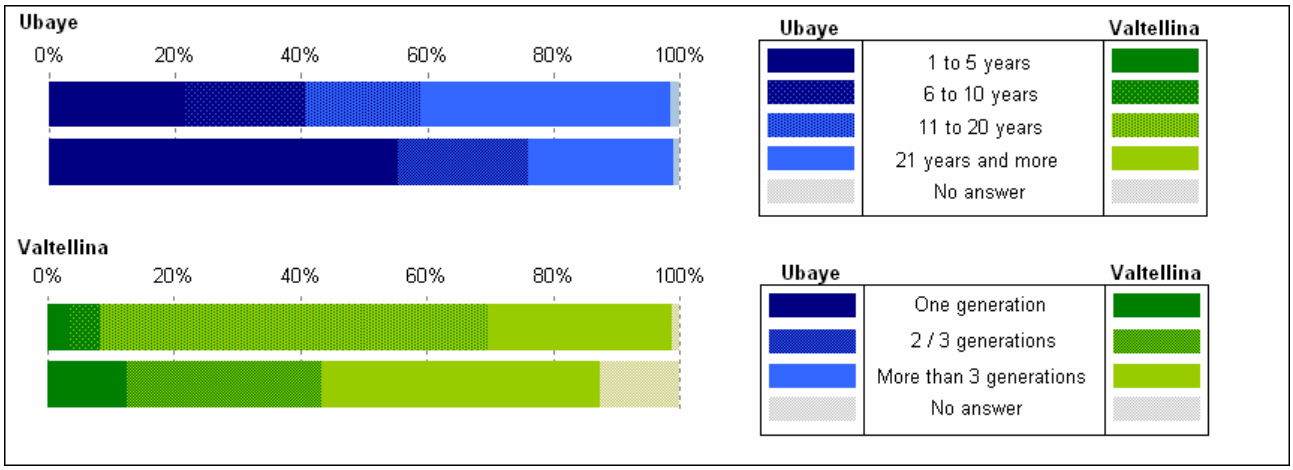


Figure 20. Distribution of the ancientness (in years and in generations) compared for both case study sites

Here an interesting difference can be observed: in the Ubaye sample more than half of the respondents are newcomers, whereas in the Valtellina sample almost half of the respondents have seen their family live in the area for more than three generations.

Other questions were asked to characterise the respondents, but most of them did not provide satisfactory or interesting answers. The housing status (owner or tenant) was investigated in Ubaye[178] but could not be analysed in Valtellina (answers to the questions on the topic were partly missing). The questions about level of education and socio-professional categories were misunderstood, with many respondents adding comments about the fact that education and domain of employment are not factors of risk knowledge. Considering the large amount of persons who did not answer to these questions it was impossible to use them for further analysis.

A question about composition of households was also eventually not used. A misconception in the question led to the impossibility to analyse the answers correctly.

Former experience with natural disasters

After questions characterising the sample, respondents were asked to precise their experience with natural disasters. This information was then used to anaylse how far previous experience shapes risk perceptions. The question was in two parts:

Have you experienced a natural disaster?

[178] The cross-analyses with housing status were nevertheless performed for the report provided to local stakeholders.

- No, and I don't know if there had been any in my commune
- No, but I know there has been some in my commune before
- Yes, but I did not suffer any injury or damage
- Yes, and I was personally affected

If the respondents chose one of the two latter, he/she was invited to give more details about the type of hazard, the approximate date, the place, and his/her impressions. This second question was open-ended. The answers to the second part did not provide the expected amount of data, as many of them were confused, unclear, or revealed that some respondents did not really understand the first question. Nevertheless, it was possible to separate respondents who experienced a natural disaster, within this group those who experienced landslides or floods (a specific focus was given later in the questionnaire about these two hazards, as they constitute the main threats in both sites) with a differentiation of those who experienced these hazards in the studied areas and those who experienced them somewhere else.

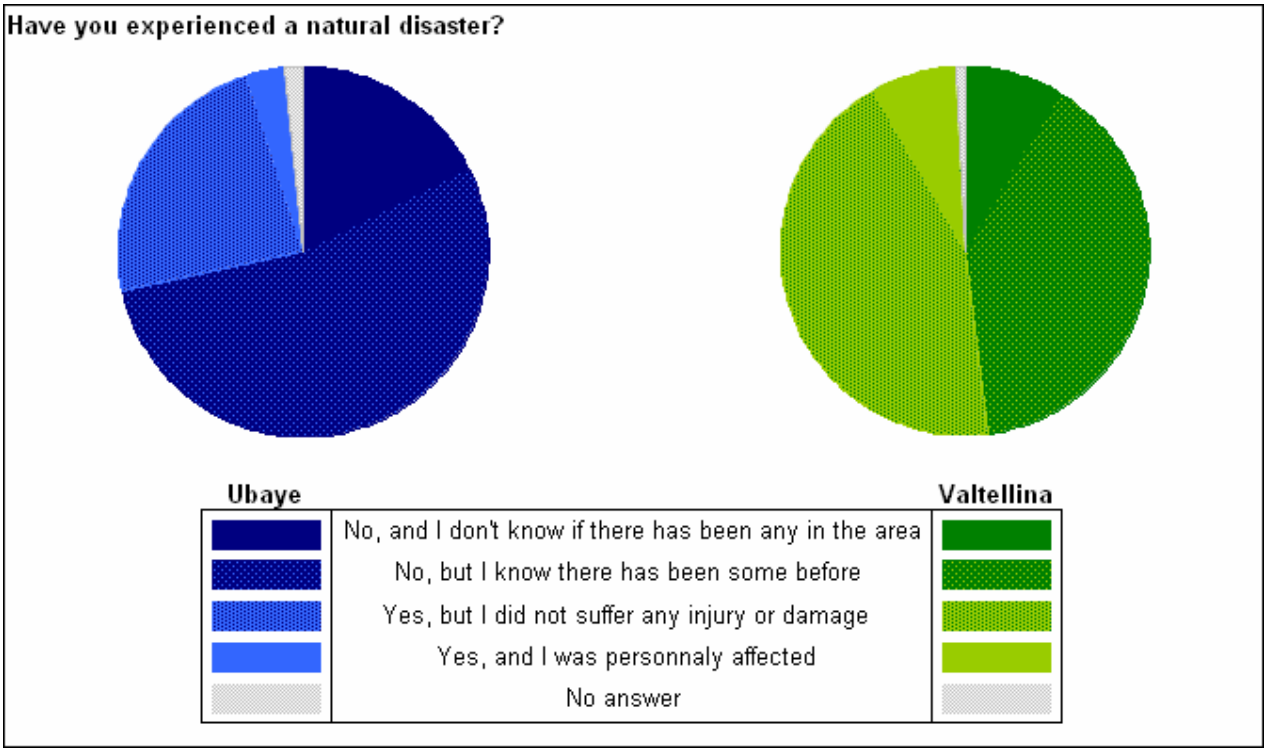


Figure 21. Distribution of answers about former experience with natural disasters

The graphics show that in both sites a large majority of respondents know about the existence of natural risks. Only a small part of them actually experienced a natural disaster, approximately a quarter or Ubaye respondents and half of Valtellina's.

In details, it was interesting for further questions about landslides and floods to investigate the type of hazard the respondents experienced, and if this experience had taken place in the studied area. The results of these analyses are summarised in the tables below.

	Ubaye		Valtellina	
Experienced landslides in Ubaye / Valtellina	7	2%	29	6%
Experienced landslides somewhere else	-	-	1	0,2%
Experienced another hazard	84	24%	161	33%
Never experienced a natural disaster	247	72%	232	48%
Not enough details on hazard or location	6	2%	60	12%

Figure 22 –Type of hazard and place of previous experience with natural disasters, for questions about landslides

	Ubaye		Valtellina	
Experienced floods in Ubaye / Valtellina	37	11%	67	14%
Experienced floods somewhere else	12	3%	1	0,2%
Experienced another hazard	42	12%	35	7%
Never experienced a natural disaster	247	72%	232	48%
Not enough details on hazard or location	6	2%	148	31%

Figure 23 - Type of hazard and place of previous experience with natural disasters, for questions about floods

Natural hazards and associated risks

A series of questions was asked concerning natural hazards and the danger they constitute. The first was a question about the general level of concern about natural risks in the community[179]. Respondents were asked to evaluate their level of concern on a five level scale:

- 1 not concerned at all
- 2 a little bit concerned
- 3 fairly concerned
- 4 a lot concerned
- 5 completely concerned

The distributions of answers (see figure below) are different. In Ubaye, almost a quarter of respondents are very concerned (rate 4 or 5) and almost half of them are not or slightly concerned (rate 1 or 2). In Valtellina much less respondents chose the 4th and 5th level (5%).

179 In both translations of the questionnaire, the word used was refering to the supra-communal level

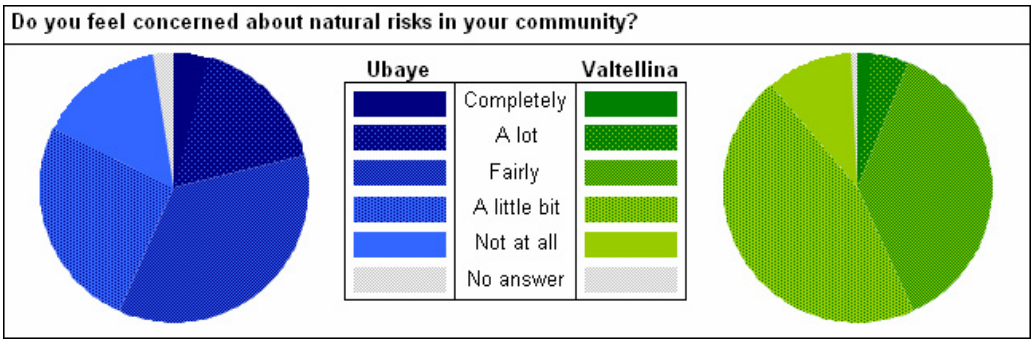


Figure 24. Distribution of answers- Concern about natural risks

To summarise, the general level of concern about natural risks is lower on the Valtellina sample. This is further showed by indices calculation[180]. The graph below represents the average indices by group. The light green and light blue lines indicate the whole sample indices, respectively for Valtellina and for Ubaye.

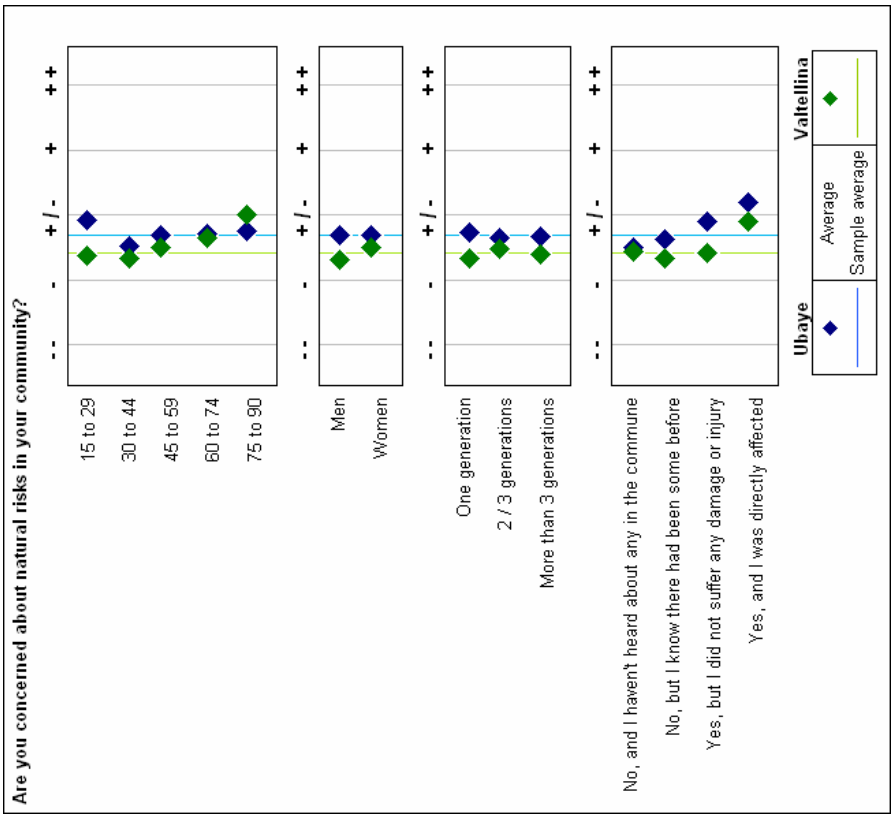


Figure 25. Comparison of average indices by group - Concern about natural risks

The comparison according to age shows a trend in Valtellina, where respondents concern increases with age. Another interesting element is the evolution (on both samples) of answers

180 For rating questions, indices were calculated by attributing weights to each level (from 1 to 5). After this averages were calculated. This allows comparison between groups. For most questions 4 factors were analysed : age, gender, ancientness in the valley, and former experience with natural disasters.

compared to previous experience with natural disasters: the closer people experienced it, the more concerned they are.

The next question addressed the danger associated with hazards existing in both sites (with more or less intensity). The level of danger was assessed on a five level scale:

- 1 not relevant in the area
- 2 lightly dangerous
- 3 dangerous
- 4 highly dangerous
- 5 extremely dangerous

The different levels are represented in the figure below.

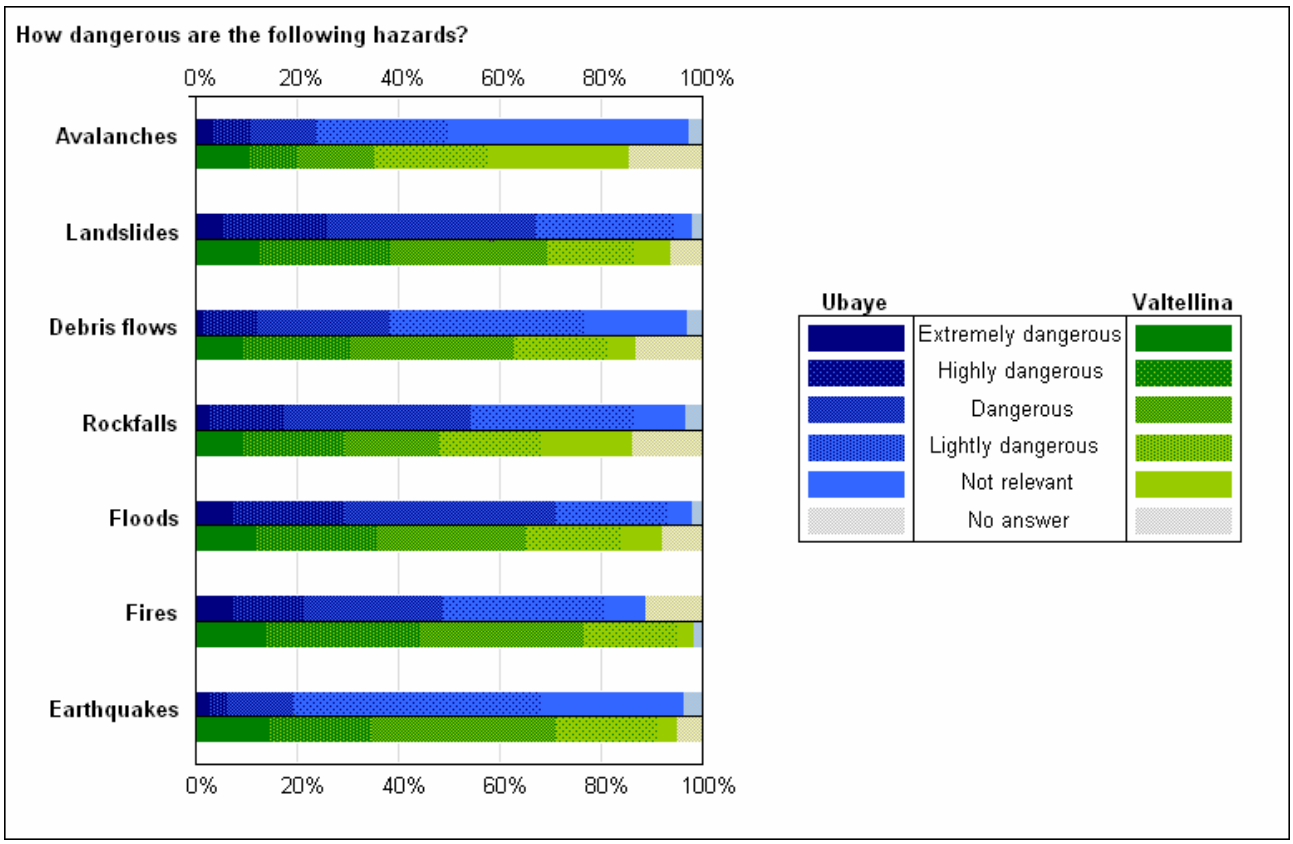


Figure 26. Distribution of answers - Danger associated with natural hazards

Similarities and differences can be observed. In both sites floods, earthquakes and landslides are seen as dangerous. In Ubaye fires are also seen as particularly dangerous.

In details, the average indices by group for each hazard show two general trends: men always rate hazards as less dangerous than women do, and the perception of danger decreases with age. This is illustrated by the figures below.

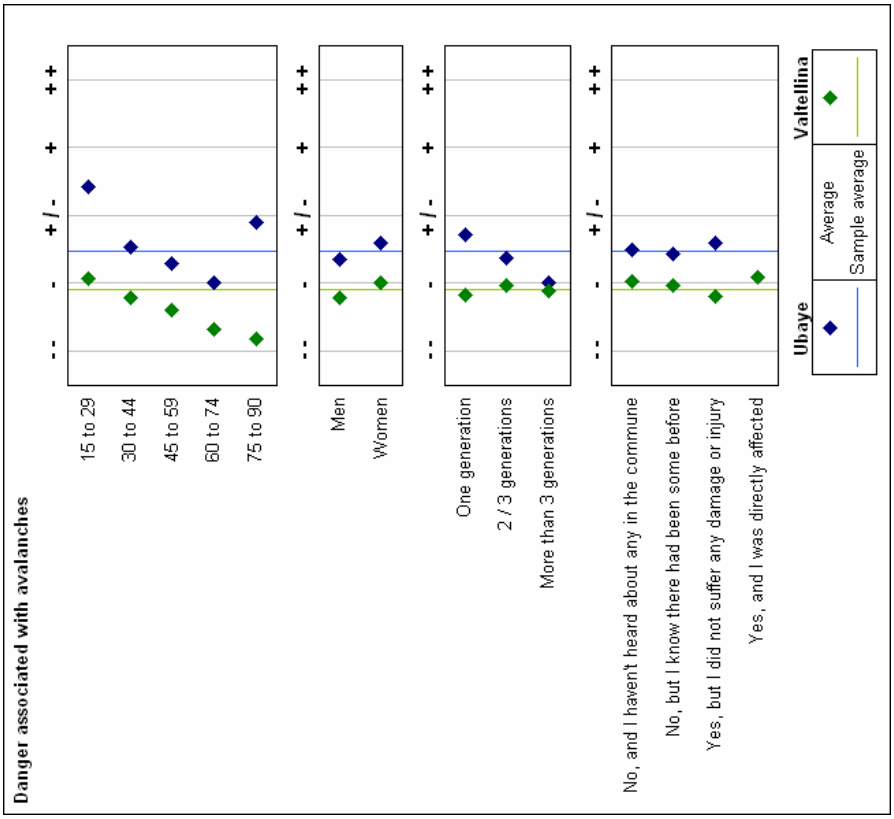


Figure 27. Danger associated with avalanches - Comparison of average indices by group

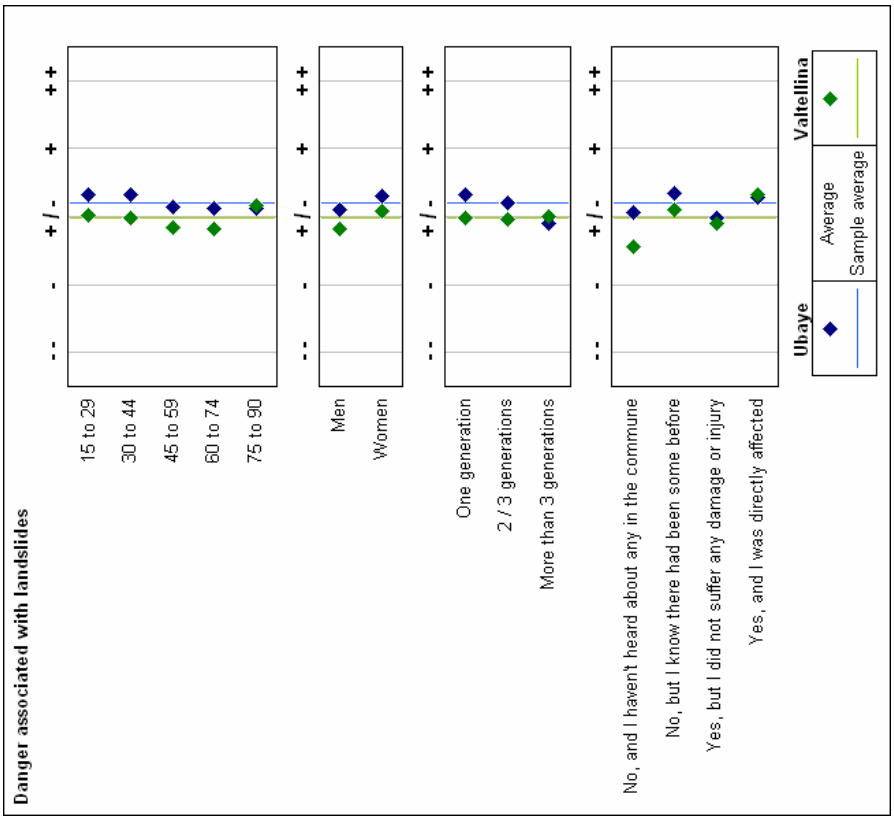


Figure 28. Danger associated with landslides - Comparison of average indices by group

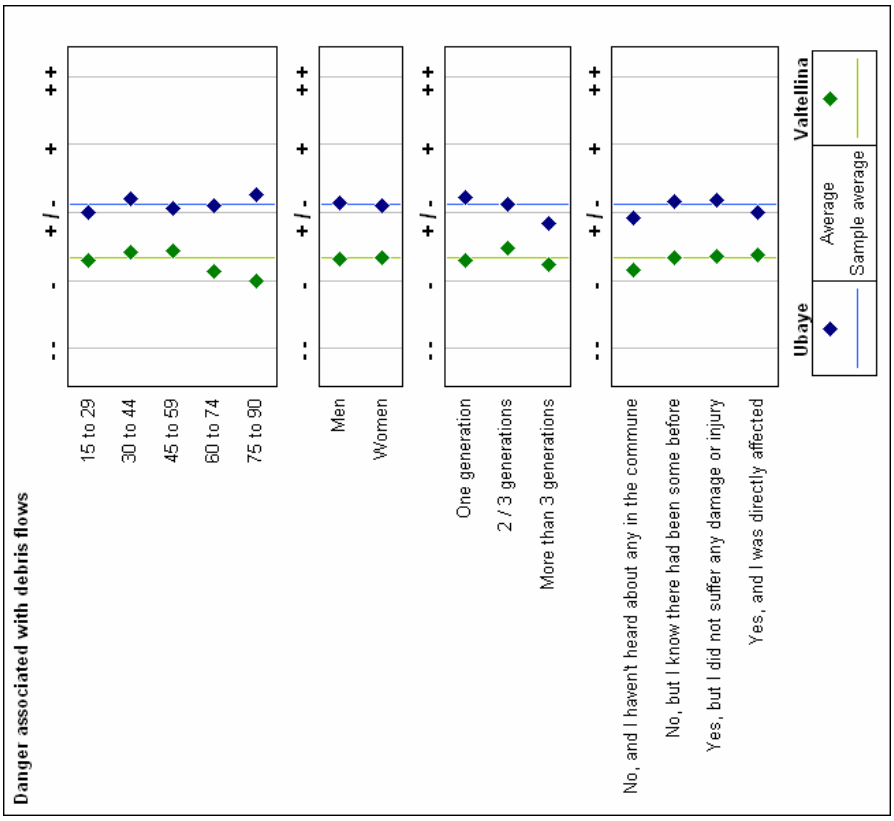


Figure 29. Danger associated with debris flows - Comparison of average indices by group

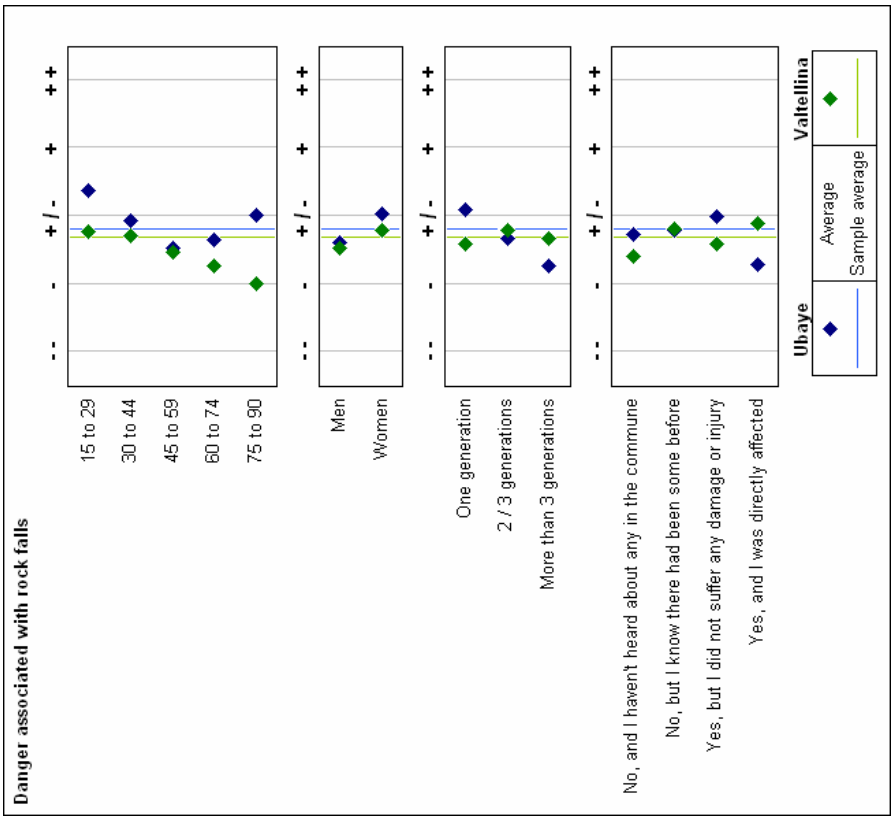


Figure 30. Danger associated with rock falls- Comparison of average indices by group

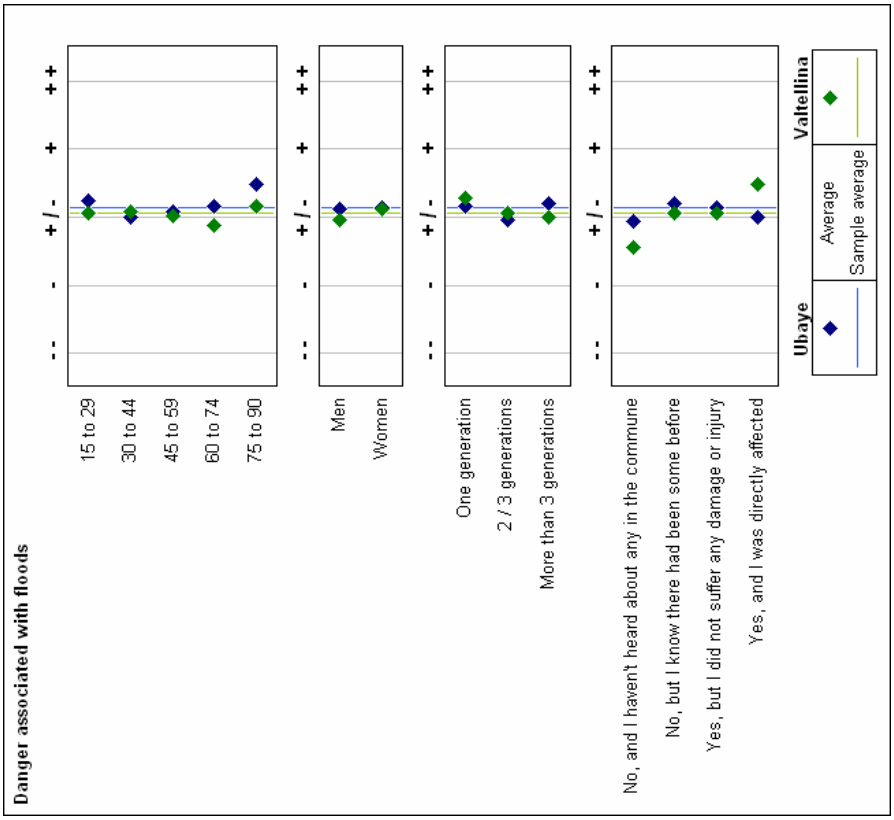


Figure 31. Danger associated with floods - Comparison of average indices by group

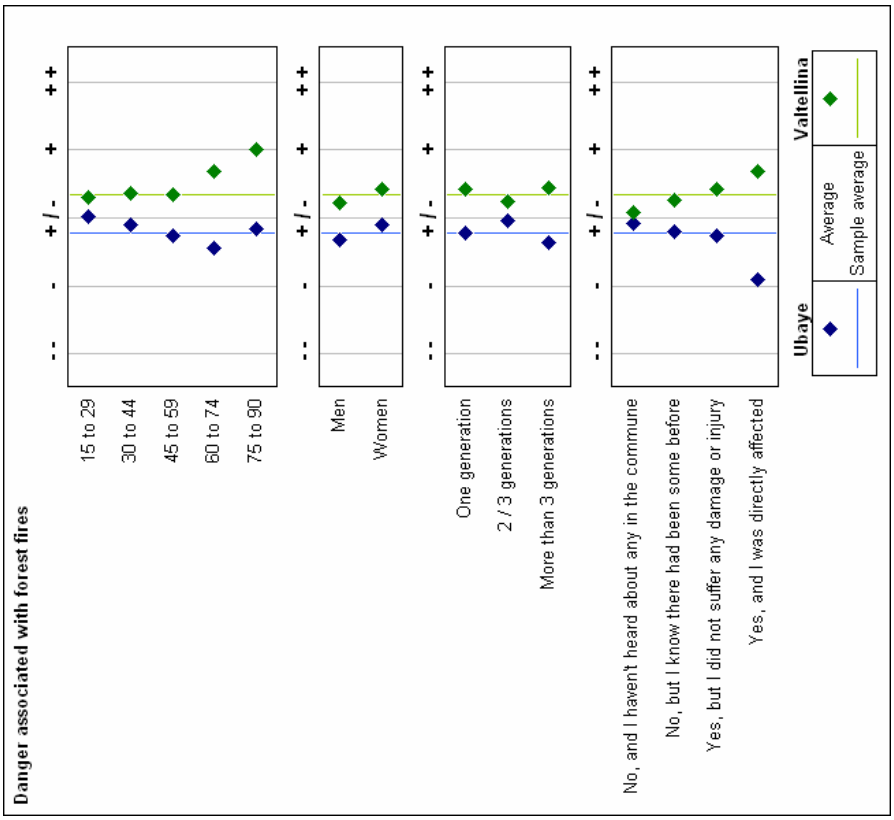


Figure 32. Danger associated with forest fires - Comparison of average indices by group

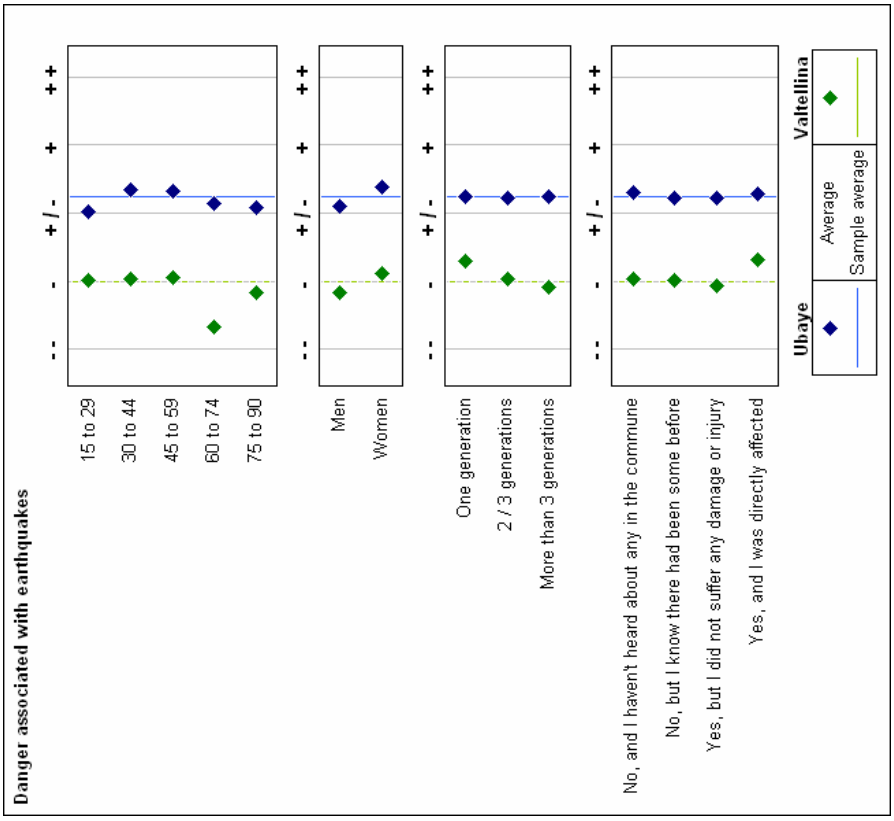


Figure 33. Danger associated with earthquakes - Comparison of average indices by group

The next question asked which hazard the respondent feared the most, offering the same list of hazards as the previous question.

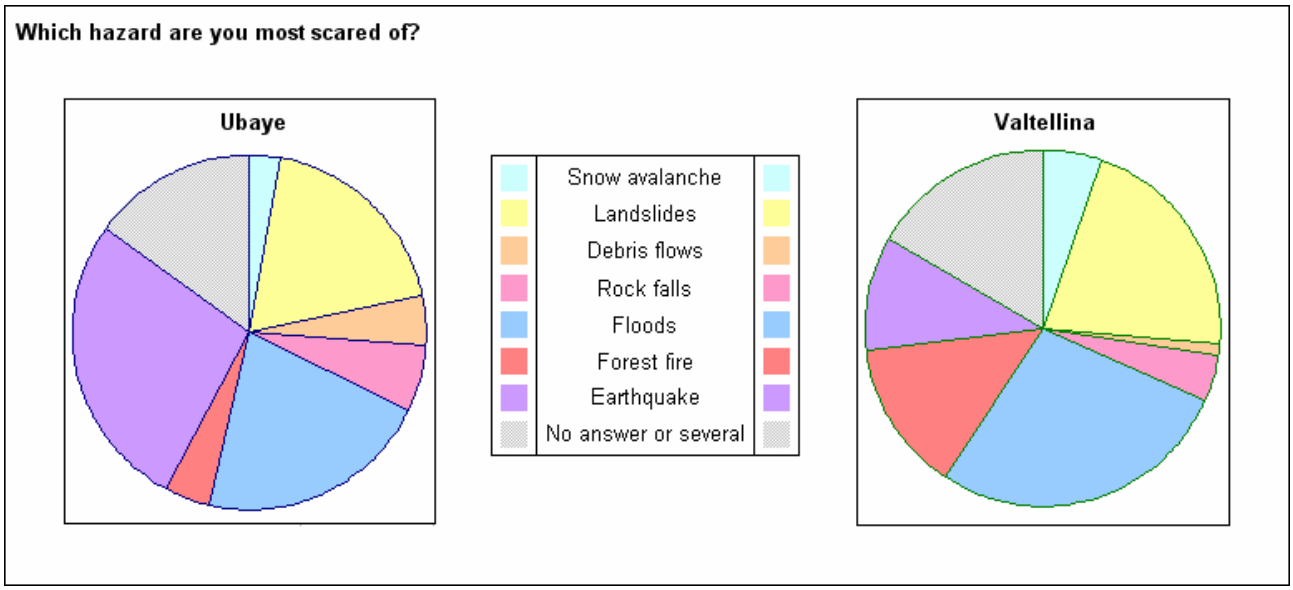


Figure 34. Distribution of answers - Most feared hazard

Again, the distributions are differing. When in Valtellina respondents are mostly scared of floods and landslides, and in a lower measure forest fires, in Ubaye earthquakes are the first cause of worry, followed by floods and landslides.

In Ubaye, this was explained not by a high level of seismicity, but because of the absence of earthquake in recent history. As people know they are under the threat of a quake, but do not know what to expect, they see the risk (not the hazard) as more scary than landslides or floods (that they did experienced recently).

The following figures show a comparison of distributions of answers according to groups. The lighter coloured blocks in the background of the graph represent the sample distribution.

For the Ubaye sample, trends can be observed according to:

- age: older groups are more concerned about landslides and less about avalanches. This could be explained by the rather regular history of landslides, opposed to the absence of important avalanche disaster in the last decades. Younger respondents might also tend to rate avalanches as dangerous because they feel more personally concerned due to their activities or leisures.

- ancientness: the fear of earthquake increases with ancientness, when landslides and floods show the opposite trend. It is commonly observed that people fear more what they don't know. Therefore it seems legitimate that respondents are more concerned about earthquakes than about landslides or floods: they know they live in a seismic area but never experienced a serious earthquake, whereas they probably faced landslide or flood events.

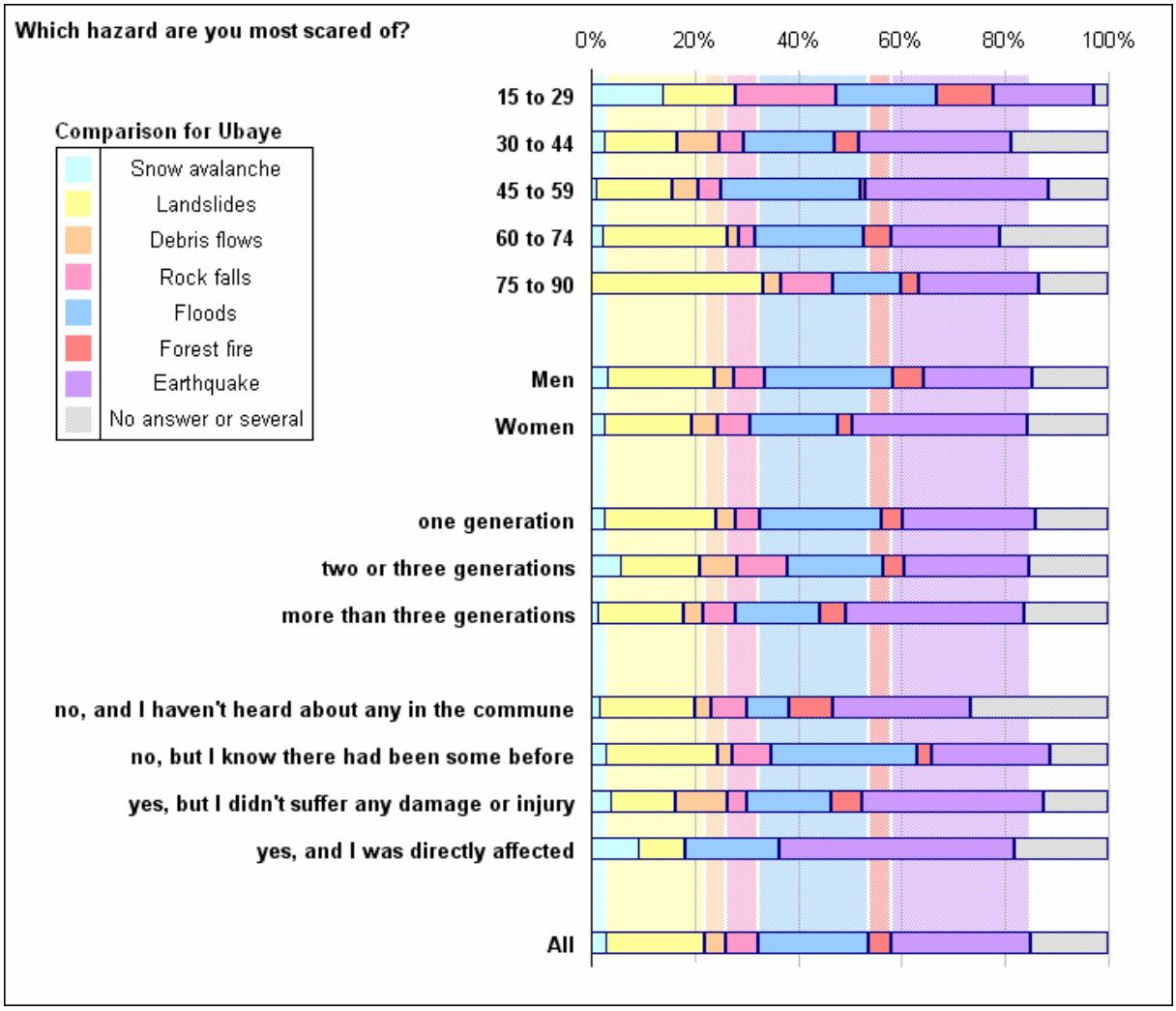


Figure 35. Compared distribution of answers about the most feared hazard for Ubaye respondents

In Valtellina also patterns can be observed:

- age: the fear of floods increases with age. This might be explained by the fact that, in the most recent events (1987, 2002, 2008, see chapter 3.3.3) the damages and casulaties were mainly due to landslides and debris or mud flows, and not to floods.

- ancientness: landslides take more importance for people settled for a longer time, when fires lose some of their scaring capacity. This could be explained by the absence of serious forest fire in the last decades.

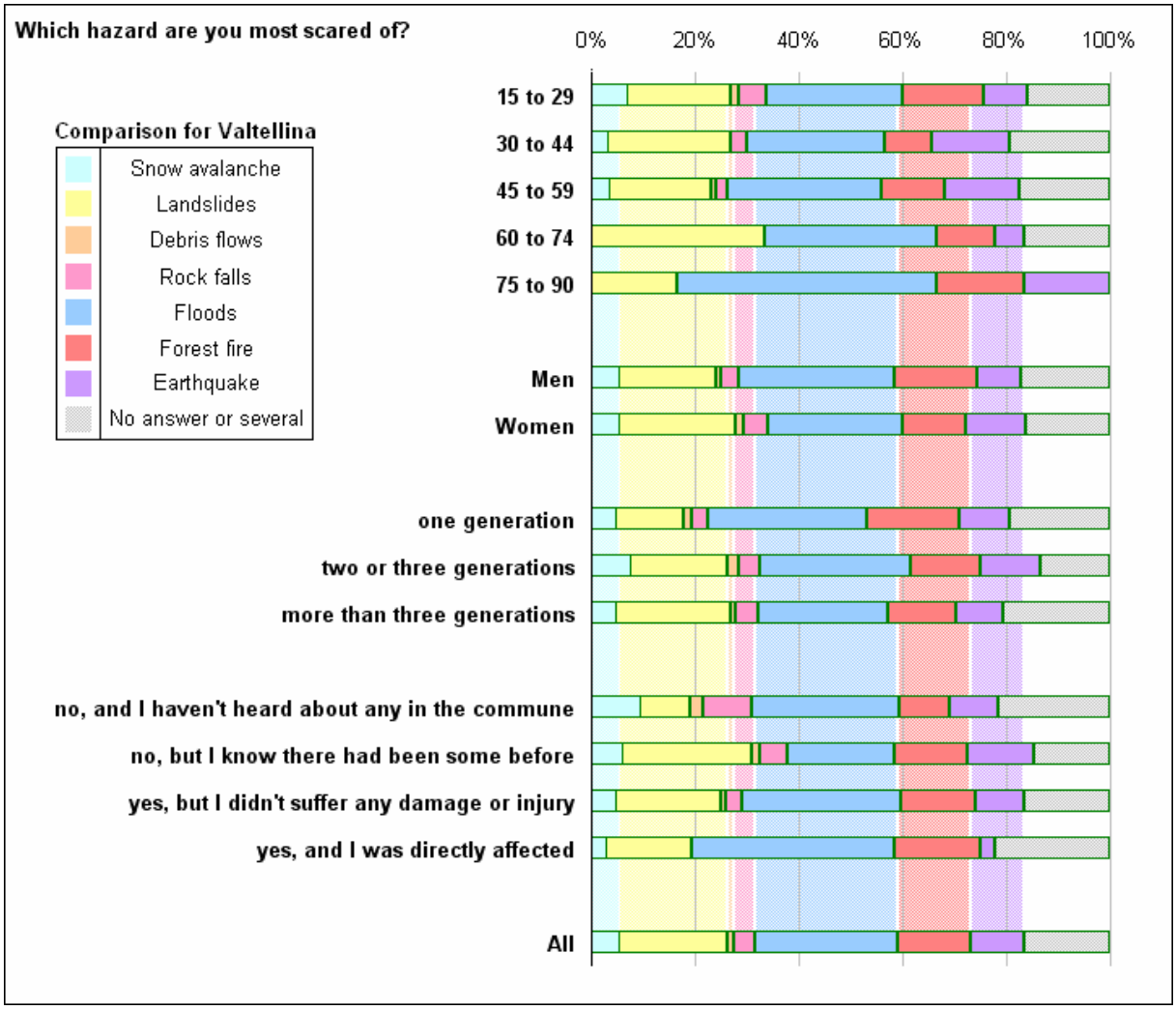


Figure 36. Compared distribution of answers about the most feared hazard for Valtellina respondents

Focus on landslides and floods

Because they represent frequent events in both Valtellina and Ubaye, a specific focus was given on landslides and floods.

First, a series of question concerning landslides was asked. A list of statement was provided, and respondents were requested to rate the likelihood of each of them on a five level scale:

- 1 very unlikely
- 2 not likely
- 3 likely
- 4 very likely
- 5 extremely likely

The statements concerned the possibility of a landslide happening in the community, and the consequences it could have.

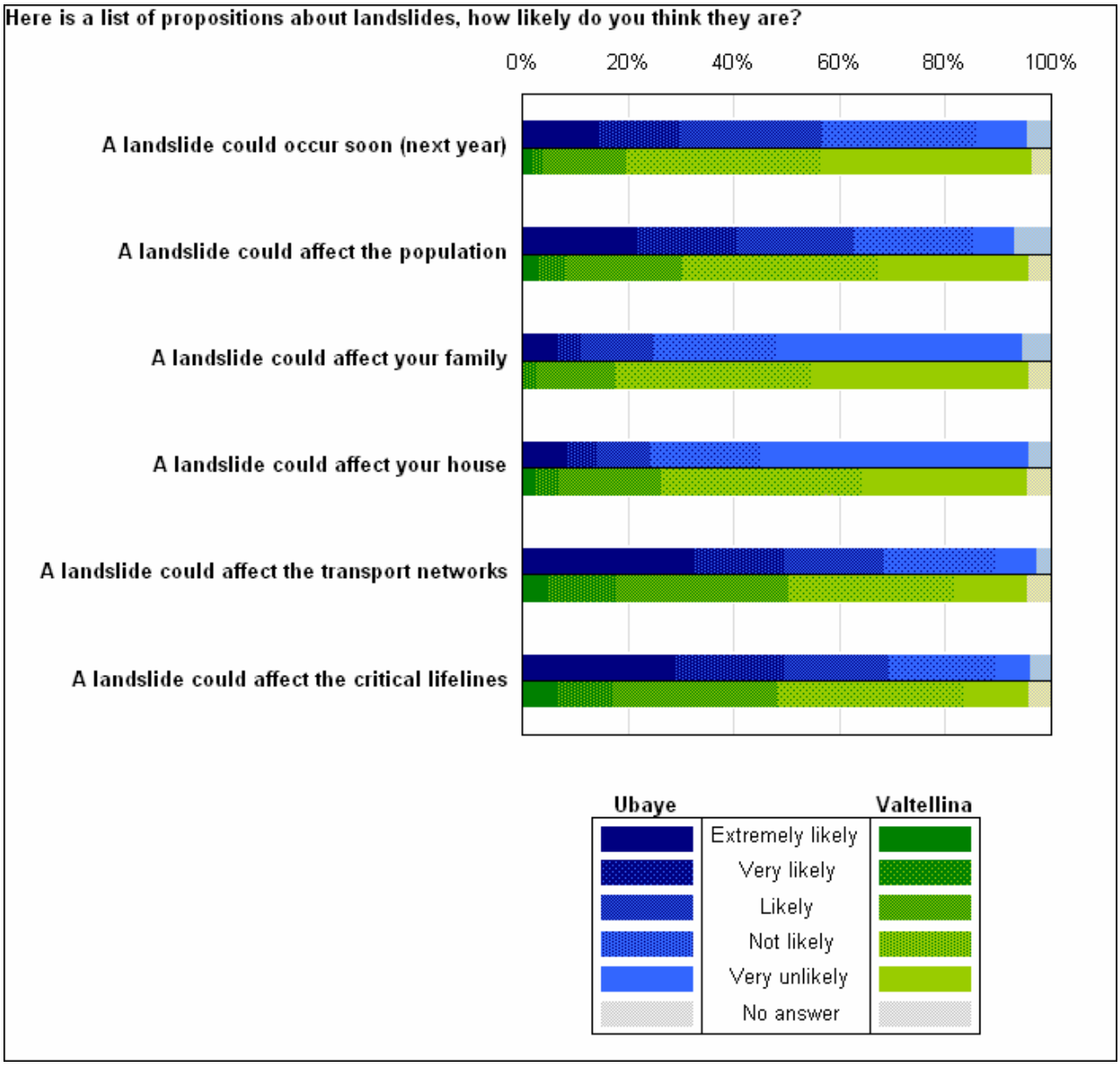


Figure 37. Rating of statements about landslides

As the figure above shows, all statements are seen more likely for Ubaye respondents than for Valtellina's. In details, the answers for each statement are compared for the different groups (age, gender, ancientness, previous experience with disaster) in the following graphes.

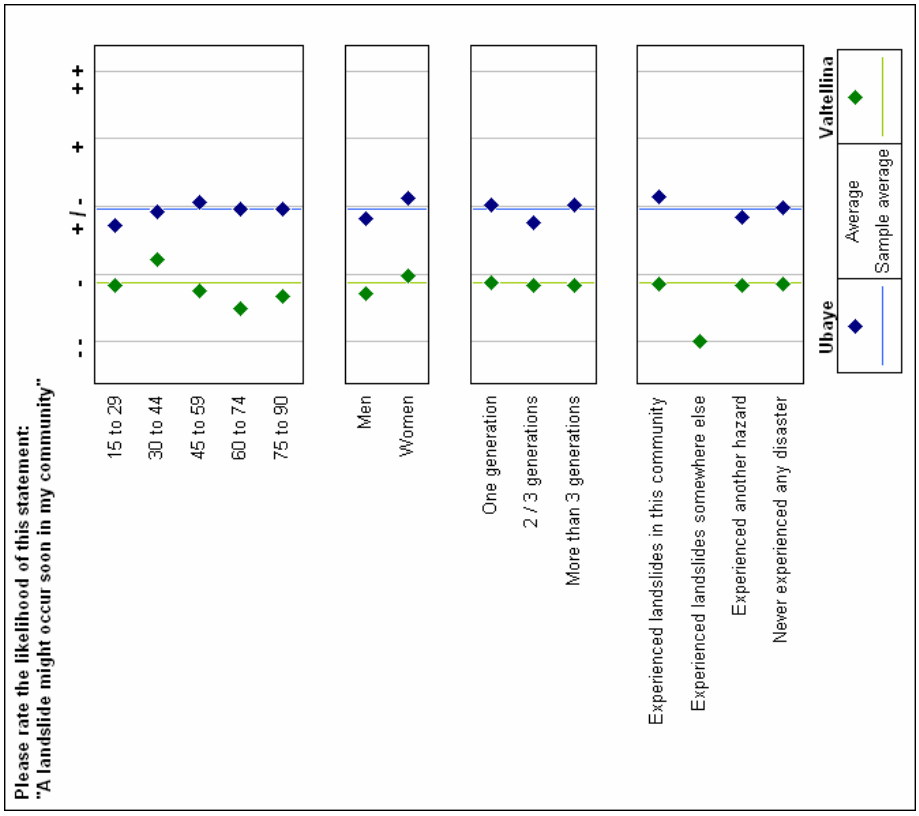


Figure 38. Compared average indices by group for the statement "a landslide might occur sooon"

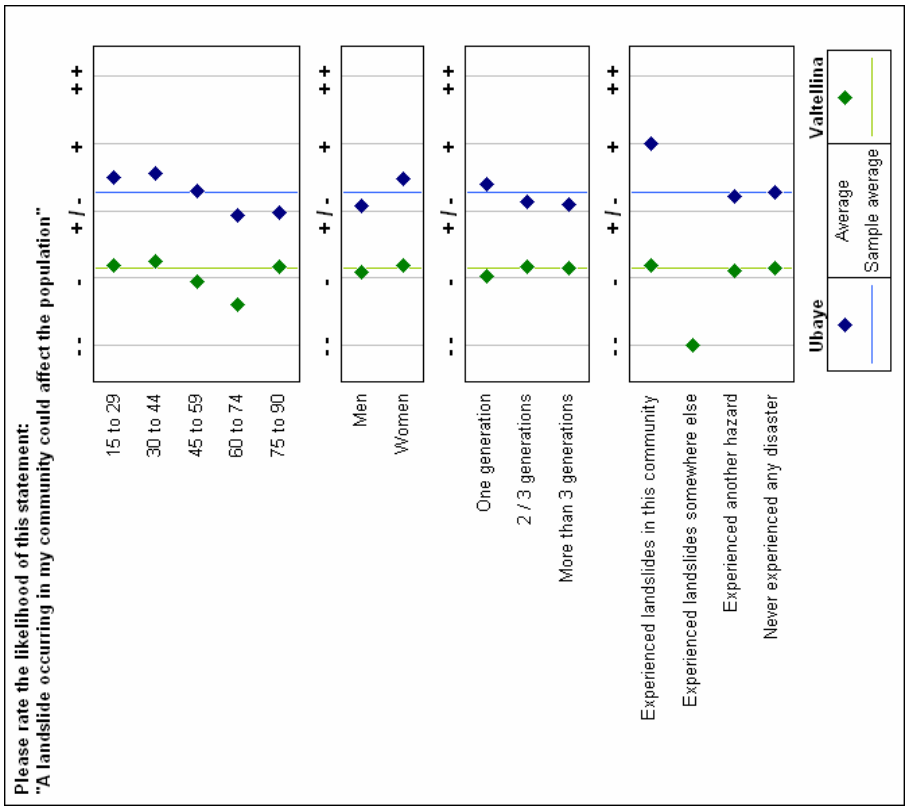


Figure 39. Compared average indices by group for the statement "a landslide could affect the population"

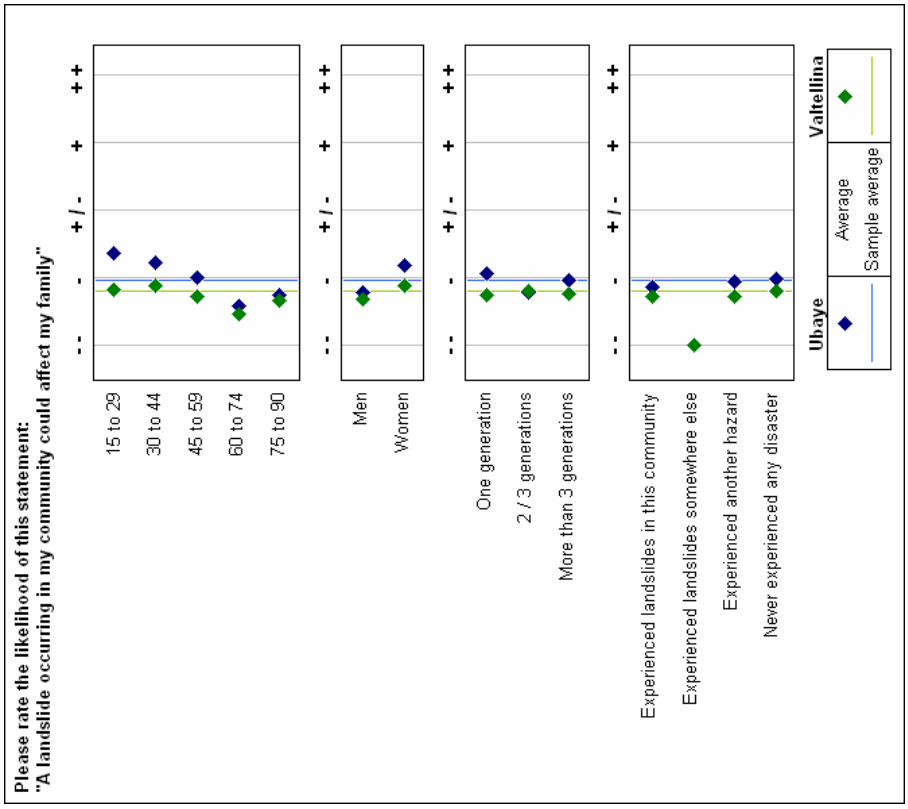


Figure 40. Compared average indices by group for the statement "a landslide could affect my family"

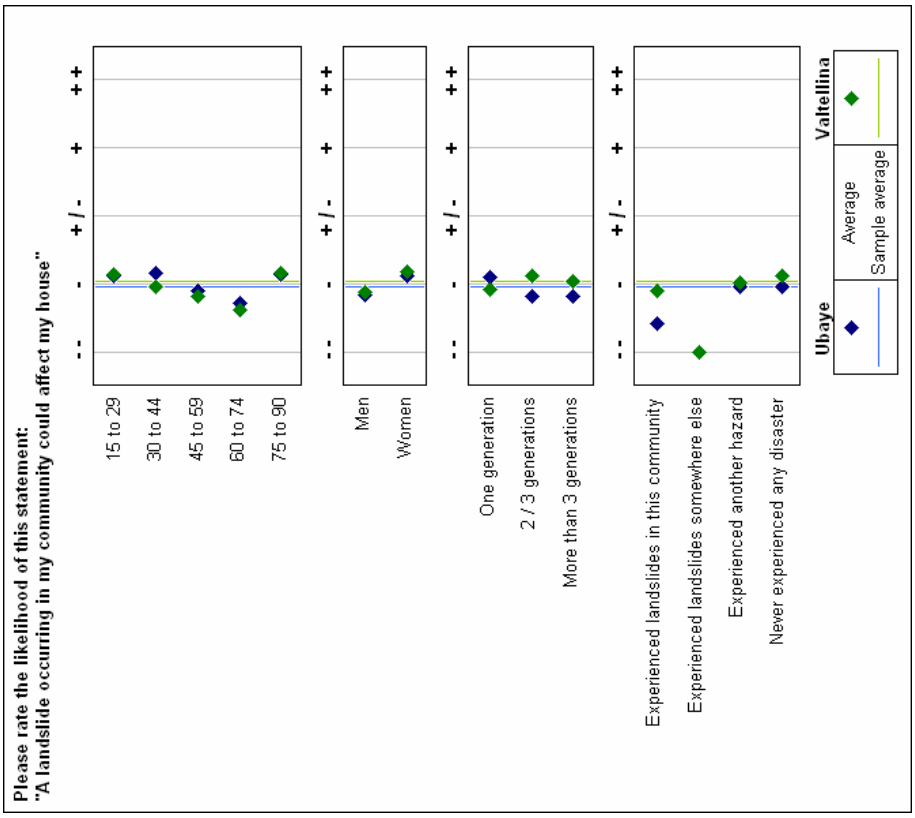


Figure 41. Compared average indices by group for the statement "a landslide could affect my house"

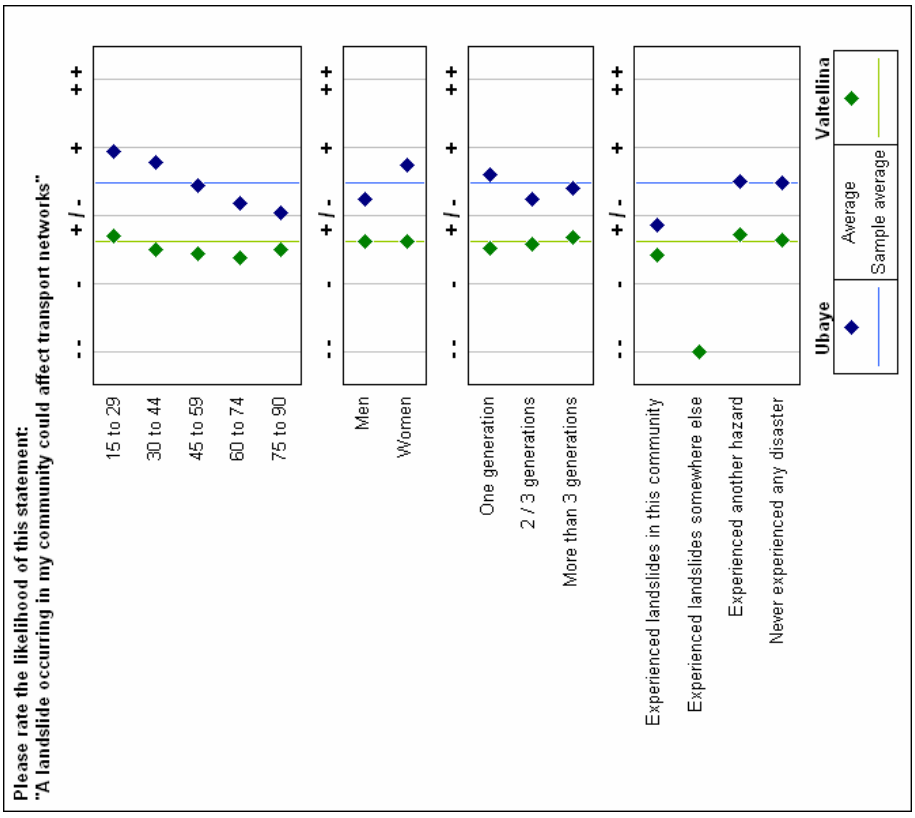


Figure 42. Compared average indices by group for the statement "a landslide could affect transport networks"

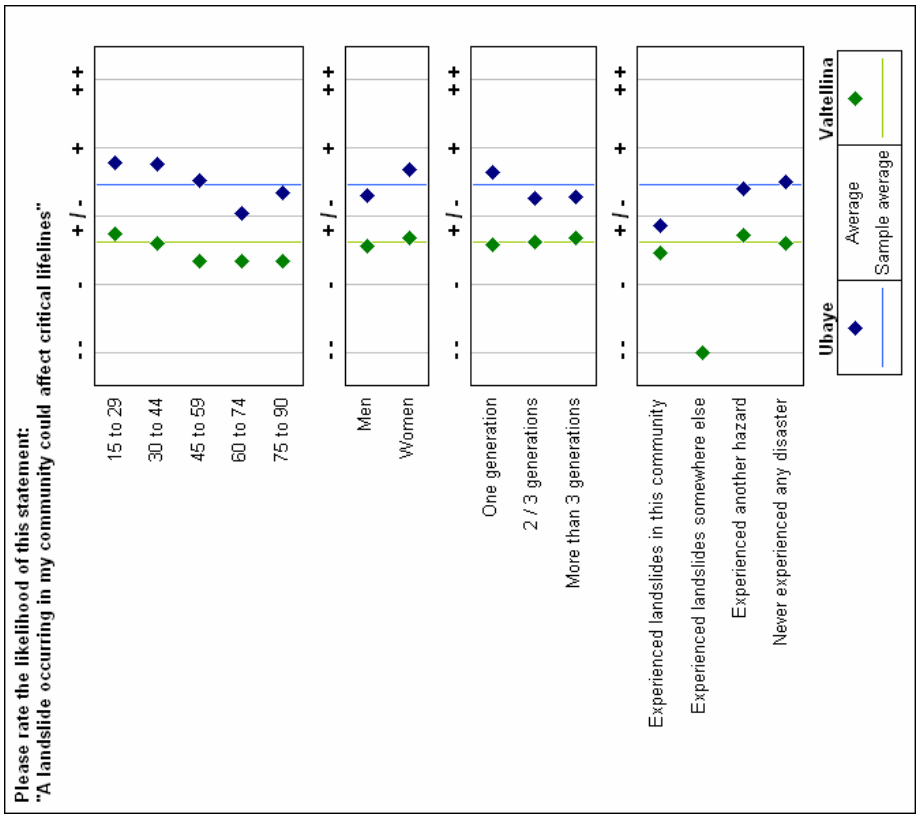


Figure 43. Compared average indices by group for the statement "a landslide could affect critical lifelines"

A pattern can be observed for both sites, when analysing the answers according to the experiences with natural disasters. Respondents who did experience disasters see consequences on the population as less likely than others do, but give more credit to the possibility that transport networks and critical lifelines might be impacted. When looking back at the recent history of natural disasters in both regions, indeed, there are several examples of roads blocked, and they were largely reported in local newspapers.

The same statements were translated for floods, and again respondents were asked to rate their likelihood. The results displayed in the figure below show that all statements were rated as more likely by the Ubaye sample than by Valtellina's. A possible factor explaining this fact lies in the "almost flood" event of spring 2008: after snow melt and heavy rainfalls the Ubaye river reached a very high level, threatening to overflow its banks. Although it eventually did not happen, inhabitants were concerned. The survey took place only a few months after this episode.

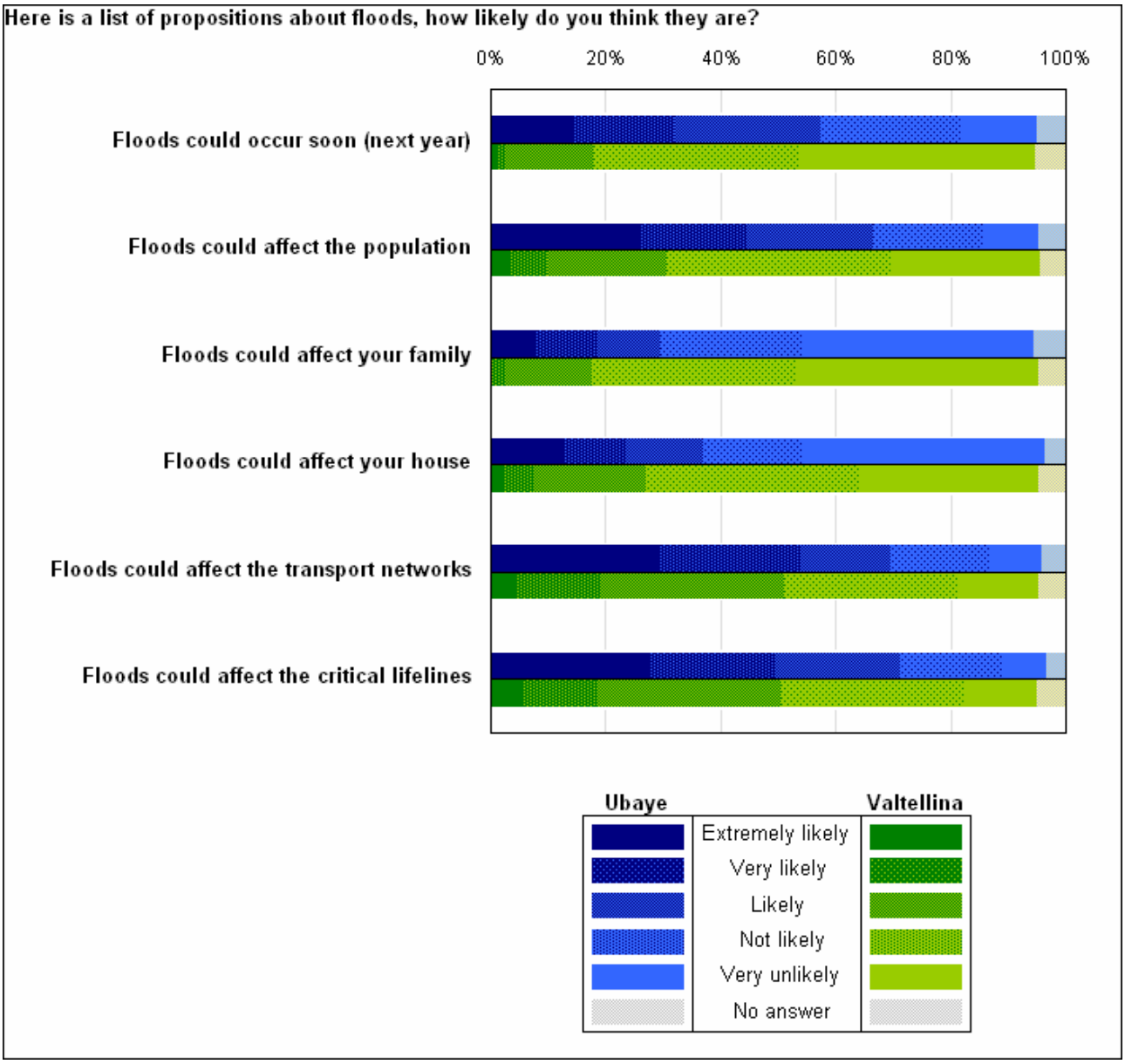


Figure 44. Rating of statements about floods

When cross analysing the answers to these questions with groups, a pattern associated with age of the respondents can be observed in the Ubaye sample (for Valtellina no clear pattern emerges). The following figures represent the comparisons of indices average by group for each statement about floods.

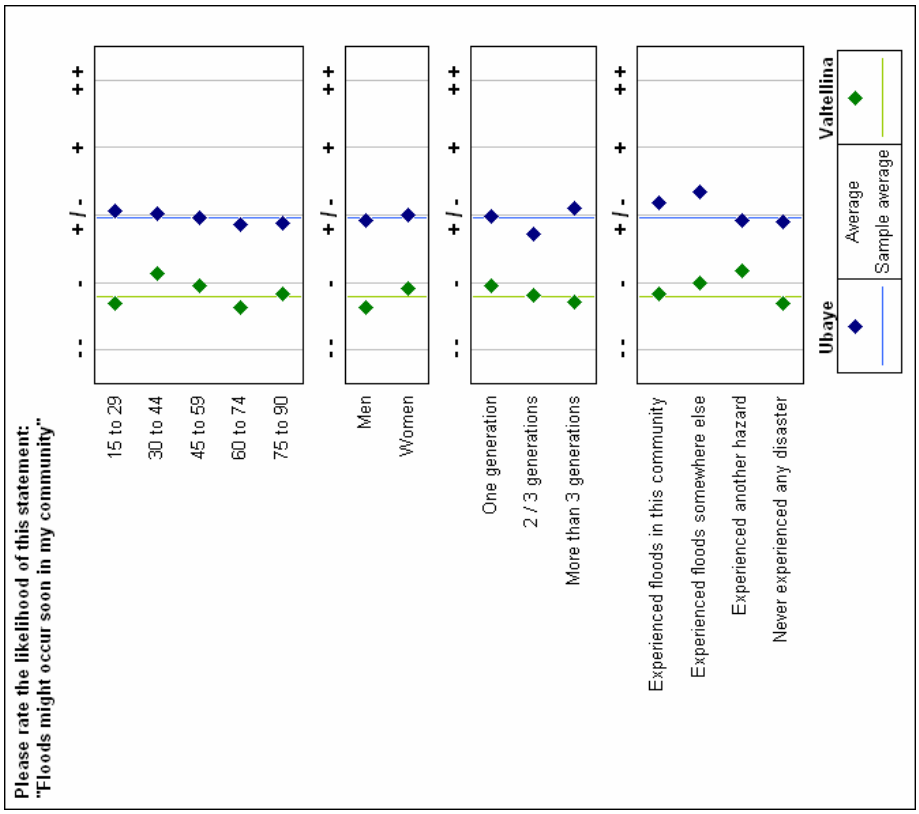


Figure 45. Compared average indices by group for the statement "Floods might occur soon"

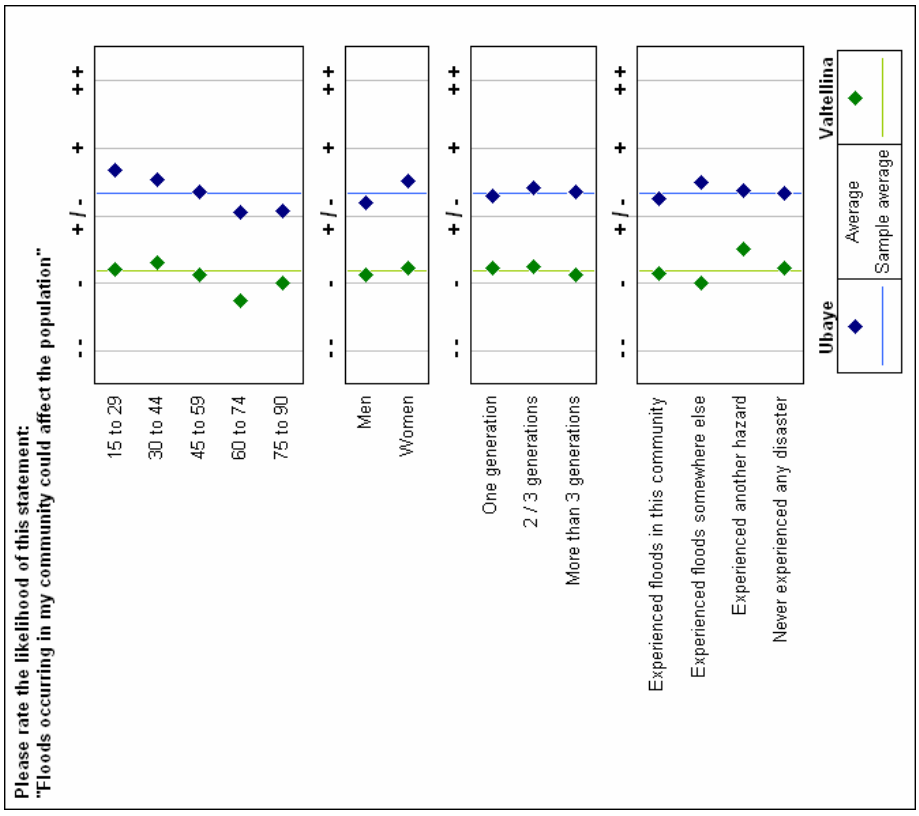


Figure 46. Compared average indices by group for the statement "floods could affect the poulation"

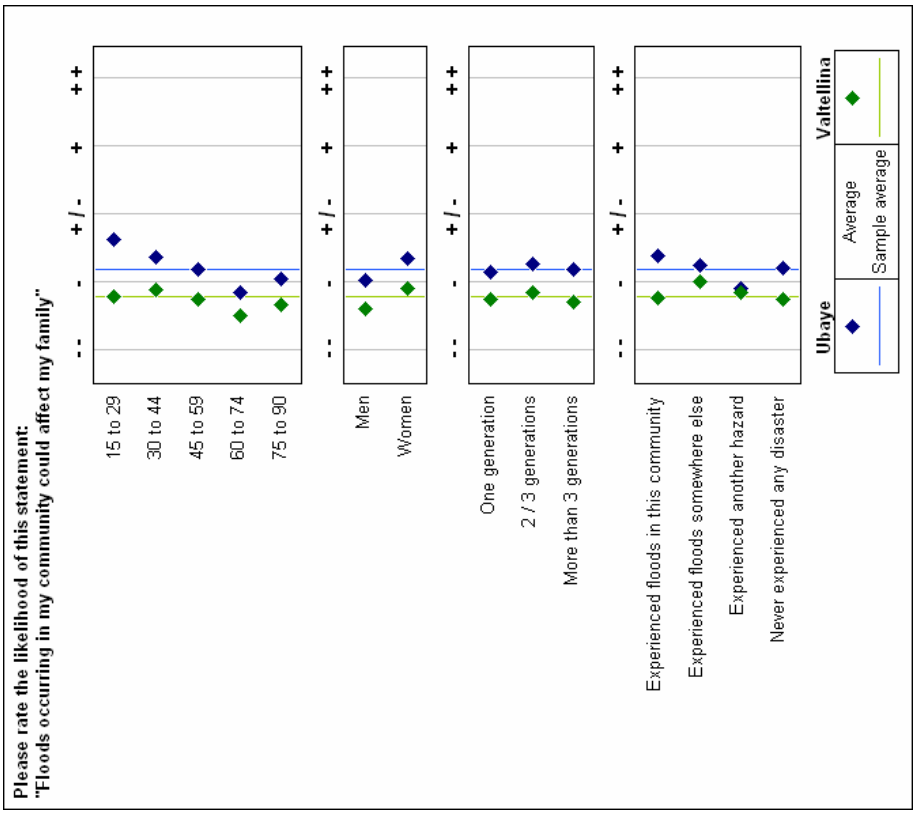


Figure 47. Compared average indices by group for the statement "floods could affect my family"

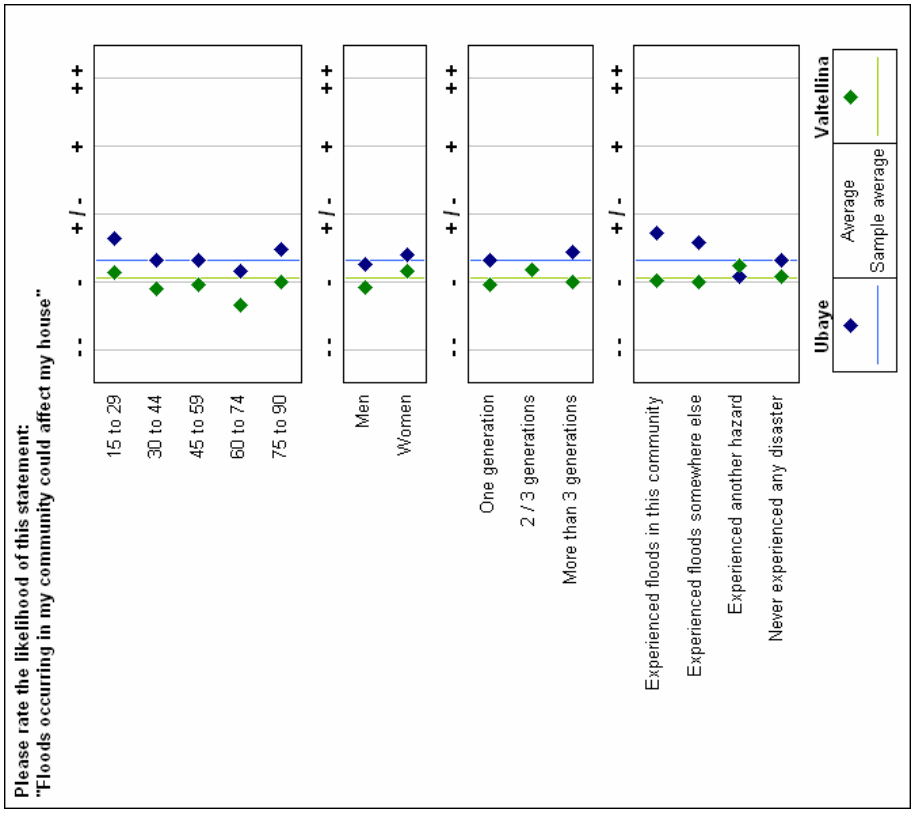


Figure 48. Compared average indices by group for the statement "floods could affect my house"

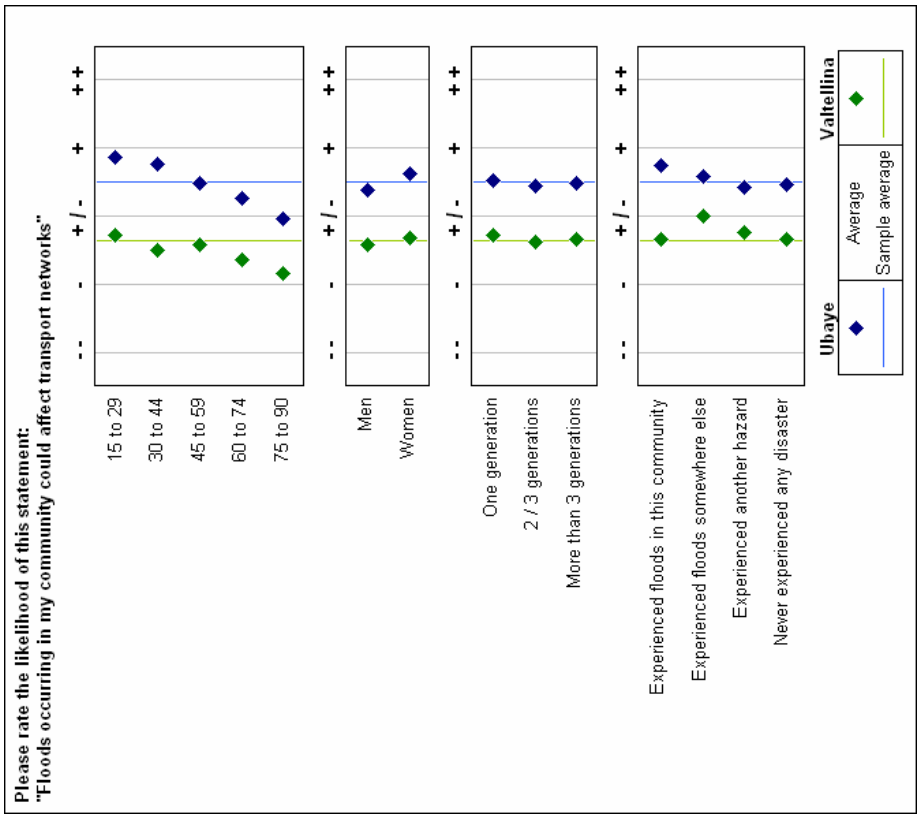


Figure 49. Compared average indices by group for the statement "floods could affect transport networks"

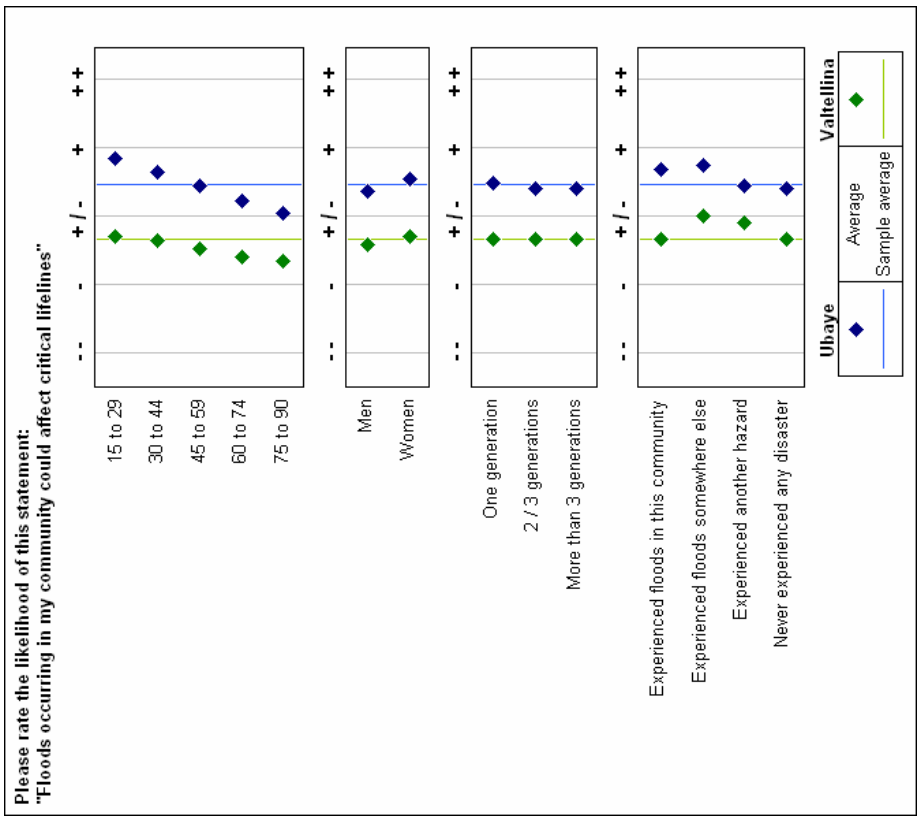


Figure 50. Compared average indices by group for the statement "floods could affect critical lifelines"

When analysing the answers to the last two questions, two interesting facts emerged:

- the first one was expected, men rated all statement less likely than women did

- the second was more surprising, respondents did rate statements applying directly to them less likely than statements concerning society as a whole. Somehow, they seem to believe that, although landslides and floods can impact their communities, they would be personally spared. This distanciation from the risk can perhaps explain certain behaviours regarding natural risks, for instance the relative lack of involvement in individual mitigation.

Information and knowledge on a individual level

The following series of questions addressed information and knowledge on an individual level.

First, respondents were asked if they had ever received information about natural risks. In the Ubaye sample half of respondents say they have, when in the Valtellina sample it is only one out of five. This is interesting, as in both cases informative documents exist, and local media have covered recent events. Despite the availability of information, a large part of population is not informed. It seems that making information available to the population is not sufficient to guarantee that it will reach its target. This is further confirmed by the next question.

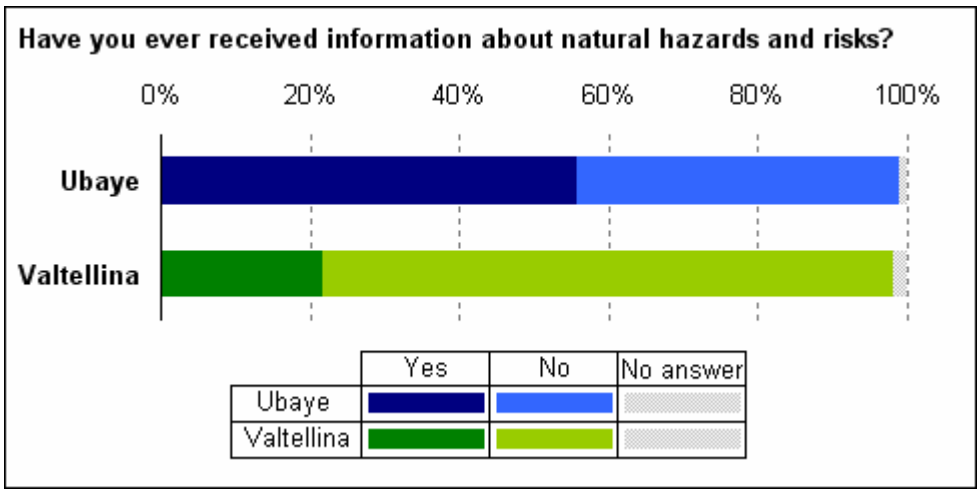


Figure 51. Distribution of answers to the question about past information

When analysing the answers by group, a dissimilar pattern can be observed according to age: in Valtellina, younger respondents were more informed than older ones, when in Ubaye the opposite

trend exists (see figure below). This fact could be used by local authorities to design information and communication campaigns targeted at the groups that feel less informed.

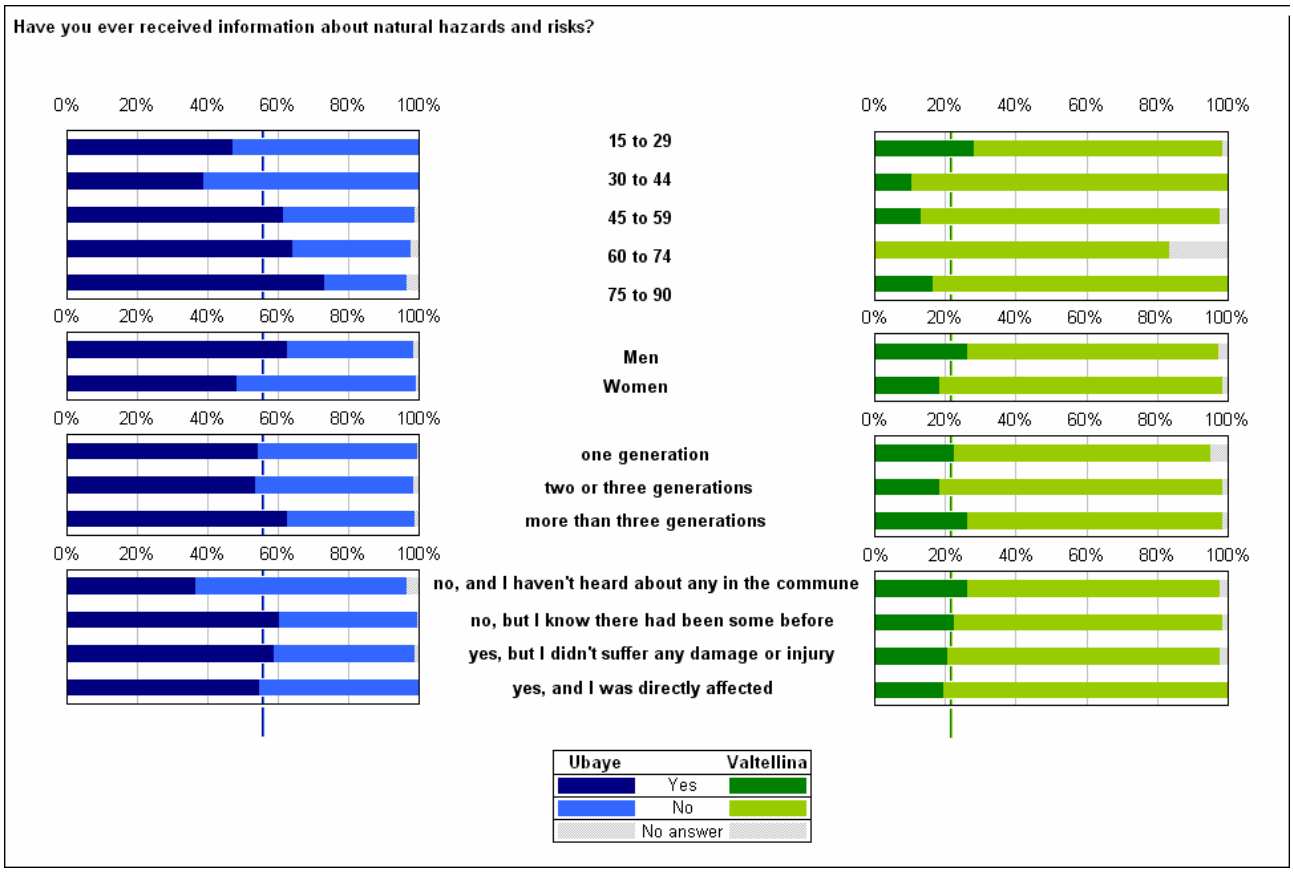


Figure 52. Compared distribution by group of answers to the question about past information

To complement the latter question, respondents were asked to precise if they had searched for information actively.

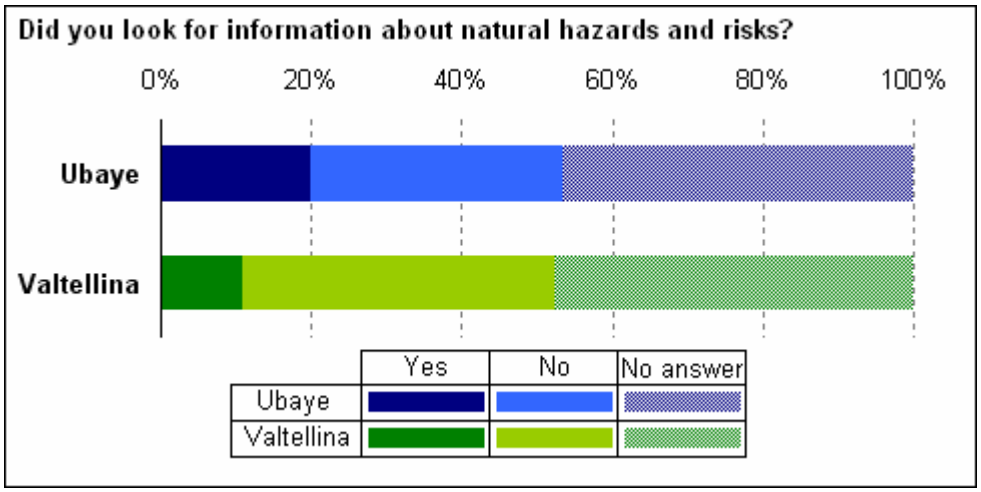


Figure 53. Distribution of answers to the question about active search for information

The answers are clear: most of them received unsolicited information (see figure below). The large place of “no answer” is due to the fact that the question was asked only to respondents who stated they had been informed in the previous question. This was corrected for the comparison of answers by group.

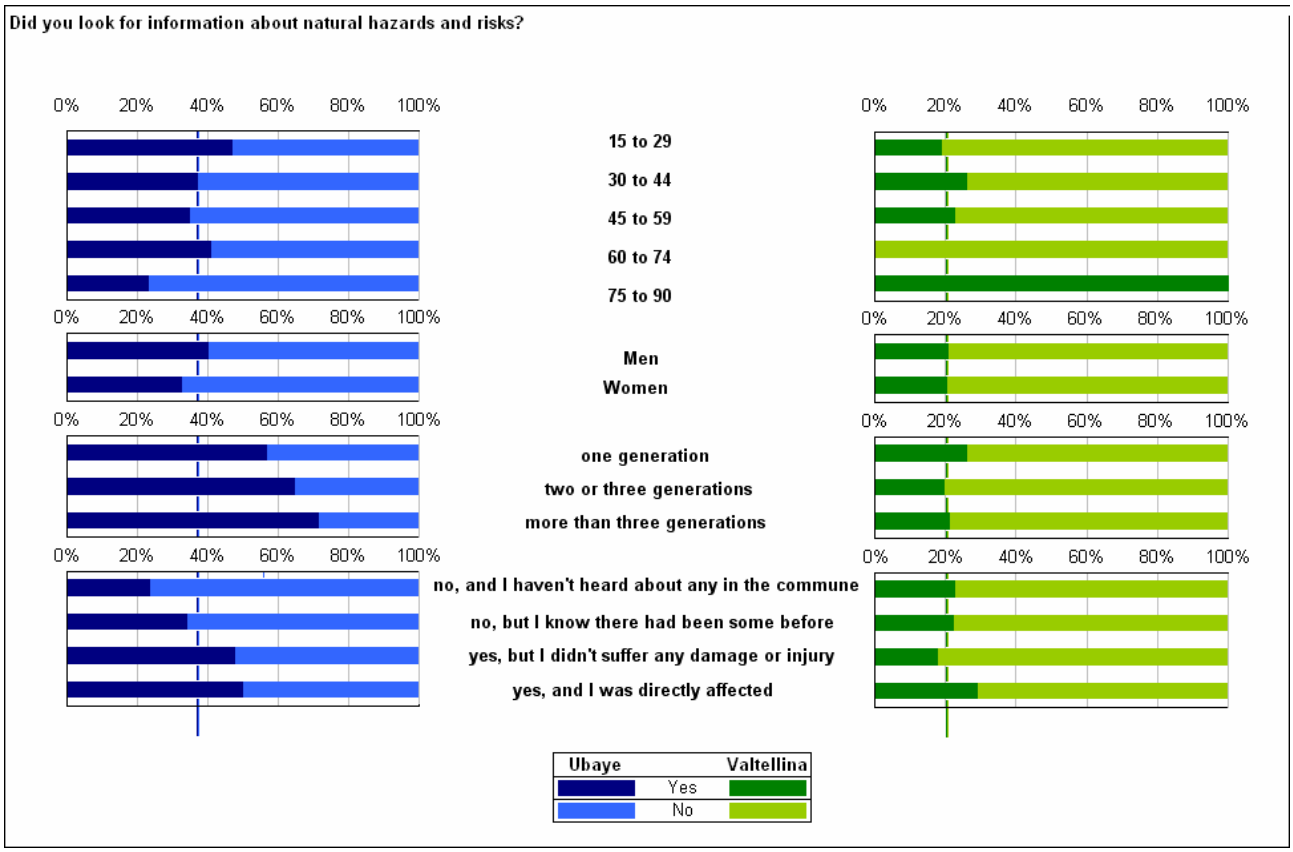


Figure 54. Compared distribution by group of answers to the question about active search for information

Interestingly, the groups that are more likely to search for information actively in the Ubaye sample are those who are less likely to do so in the Valtellina sample: older age groups, respondents who did experience a natural disaster but where not personally affected. In both cases though, people who were personally affected by a disaster are more likely to be active in researching information.

This fact could be used when designing communication campaigns, considering that people who never suffered from consequences of a natural disasters are more likely to expect unsolicited information. When crossing this with the answers to other questions (see further) specific campaigns could be considered, targeted at different groups.

After this, respondents were asked if they wanted to received more information about natural risks. The figure below, displaying the distibution of answers, is clear: most of them are soliciting more information.

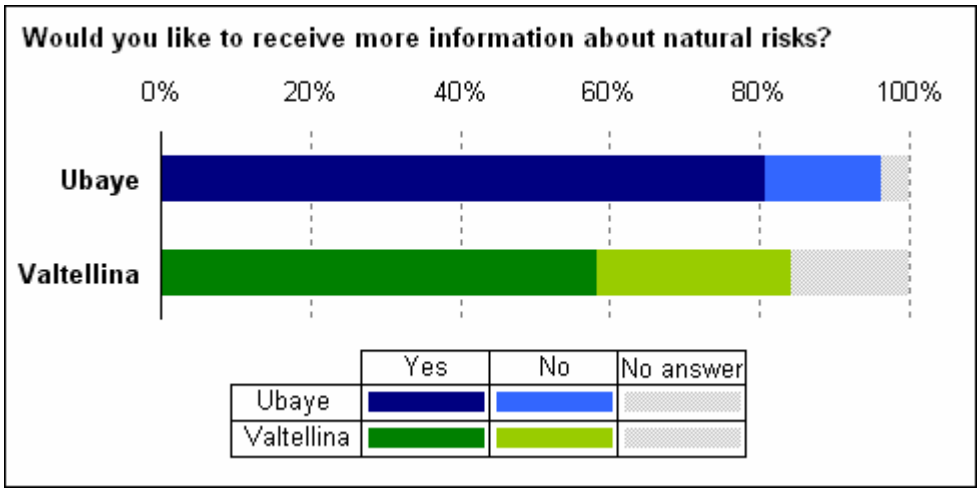


Figure 55. Distribution of answers -Asking for more information

When looking in details at the distribution of answers according to groups, the Ubaye sample shows a pattern with age (younger groups want more information than older ones), when in Valtellina the interest for more information reaches a peak with middle-aged respondents (45 to 59). In addition, in both sites people whose families are settled in the valley for more than three generations are less demanding, when respondents whose parents were already installed there are asking for more information. This indicates that information targeted at newcomers is not sufficient.

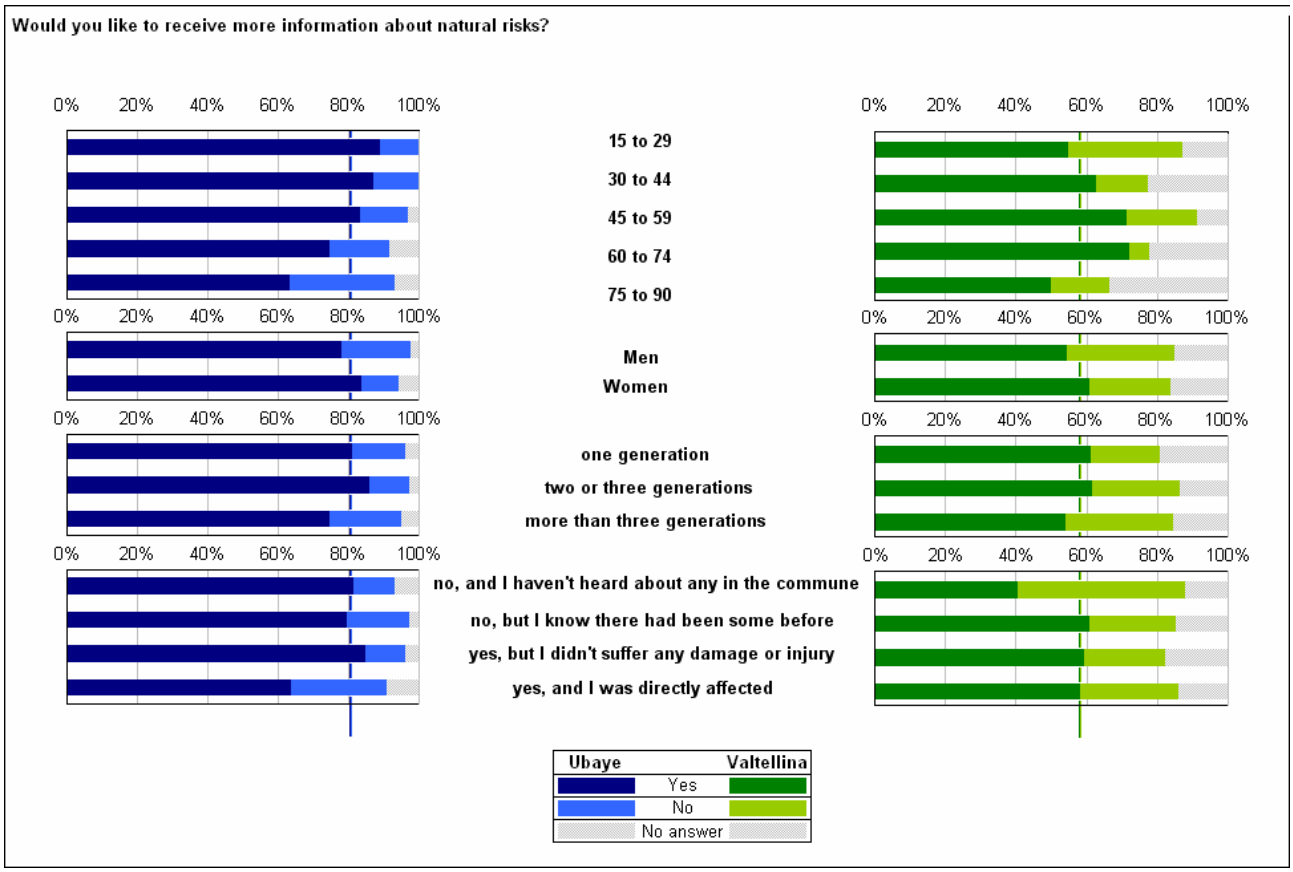


Figure 56. Compared distribution by group of answers - asking for more information

The next question, about the perceived level of individual information and knowledge about risk, was controversial. Indeed, as the level was self-assessed, several biases could have influenced the answers. Respondents might want to make a statement with this answer, either by pretending that they know far enough about risks (and imply that they are prepared to react) or inversely by voluntarily understating their level of knowledge (and suggest that the knowledge they have is not sufficient to react properly).

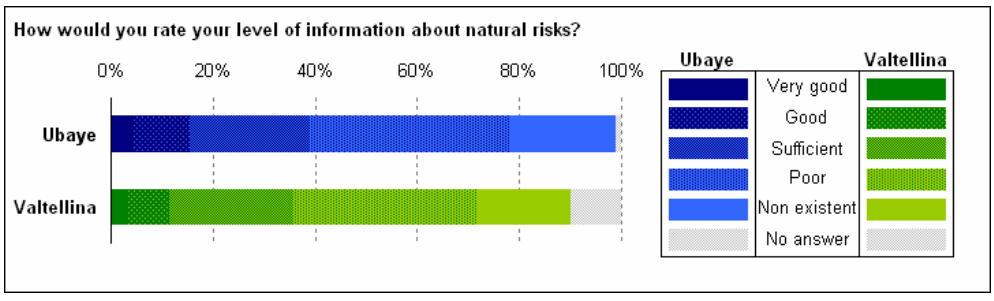


Figure 57. Self-assessed level of knowledge about natural risks

As the figure above shows, most respondents, in both sites, opted for the second behaviour. They feel that the knowledge and information they have about the natural risks in their community are not sufficient, more than 10% of respondents even consider they have no information at all.

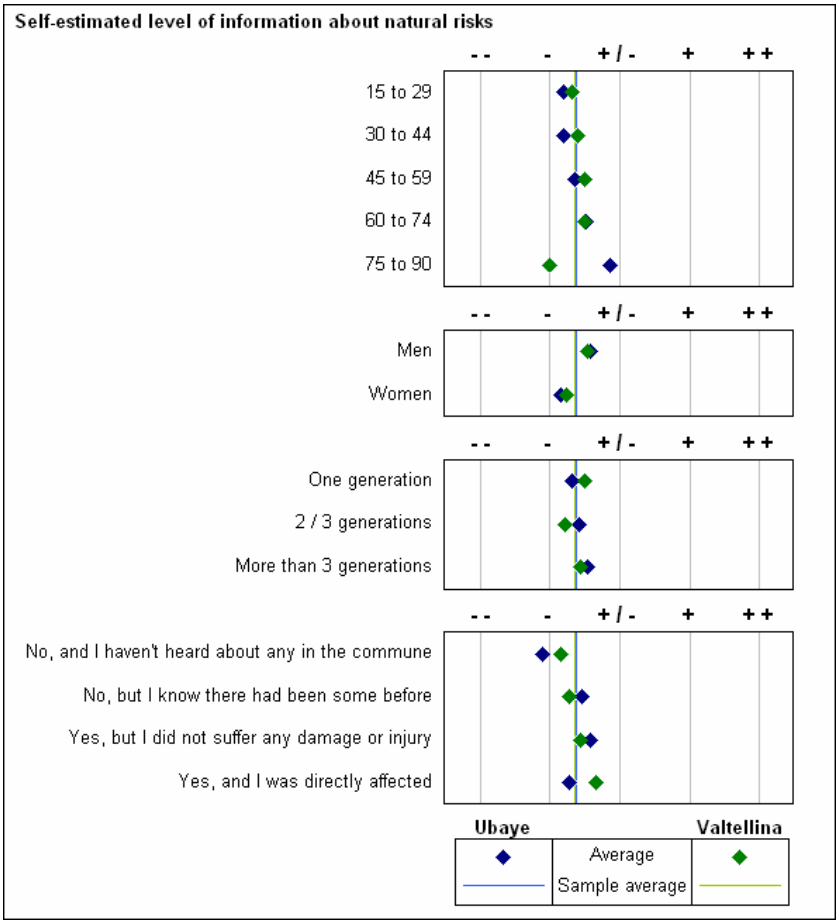


Figure 58. Comparison of average indices - Self-assessed level of knowledge about natural risks

The cross analysis with groups reveals several interesting facts:

- In both samples, the perceived level of information increases with age
- In both samples, the perceived level of information increases with experience of natural disasters.

This seems in line with the answers about the demand for information: it makes sense if respondents feel that their level of information and knowledge is low that they would like to benefit of more information.

Media for information

The next series of questions addressed the media by which information about natural risks is communicated.

First, the respondents were asked by which media they already had received information.

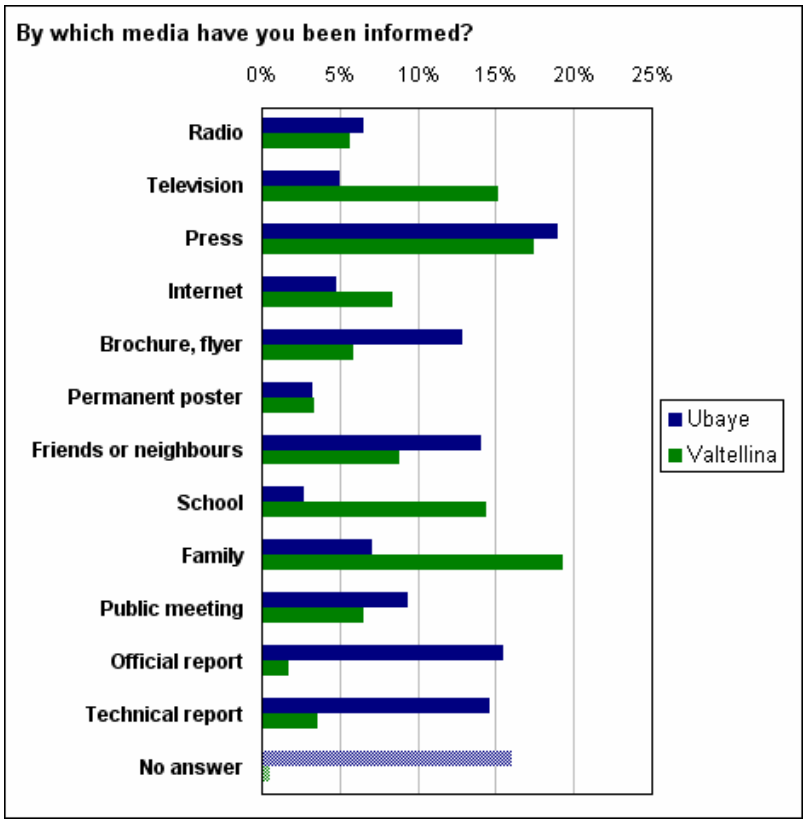


Figure 59. Media of past information

The main vectors of information are differing: the Ubaye sample received information from newspapers and reports on risk and hazard (official or technical reports) when the Valtellina sample refers mainly to their family circle and mass media (television and press).

When looking more in details, some facts were observed[181]: In the Valtellina sample, there was no significant difference between groups. In the ubaye sample on the contrary, two interesting facts emerged:

- As cliché as it might seem, men had received more technical information (technical reports, official reports) than women (who benefited more of information from their acquaintance circle)
- Newcomers (people whose family has been living in the area for less than a generation) stated that they received more information in the form of reports than by newspapers. Perhaps this illustrates a willingness to get background information on the risk situation, by going through the available documents.

[181] The results of the cross analysis of answers according to groups is available in annex.

Later in the questionnaire respondents were asked by which media they would like to receive information about natural risks. The distribution of answers is shown in the figure below.

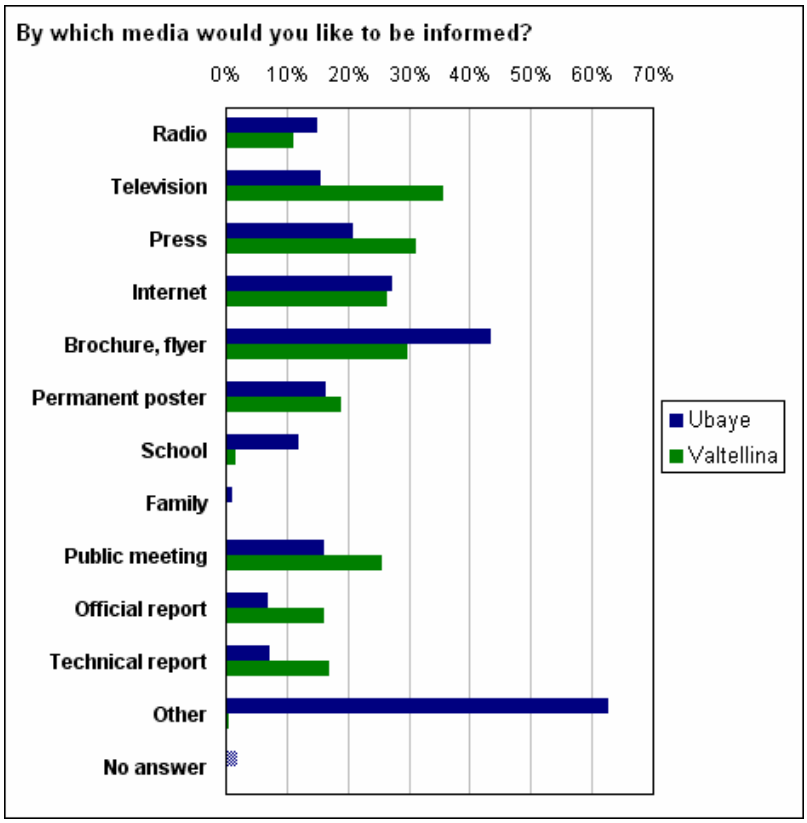


Figure 60. Media asked for further information

Two very different contexts are expressed through these answers. In Ubaye, the first media solicited for information is the municipality. In fact, it publishes a regular newsletter about local life, that already addressed natural risks issues several times. The Ubaye respondents also named flyers and brochures, press and reports as favoured vectors for information. In Valtellina on the other hand, mass media seem to be favoured, with television and press ranking first. A flyer or brochure based campaign would also be of interest for respondents.

This illustrates two visions of risk information and communication. In the Ubaye sample, respondents rely strongly on the municipality (rightly, as it is reponsible for safety), when in the Valtellina sample they prefer global information available to a large audience, but probably not site specific.

When analysing in details the different distribution of answers according to groups, a light tendency could be observed in the Ubaye sample, where women were asking for “educative” media (permanent poster, public meeting) and men for more punctual and event related information

(television, radio). Other than that, no specific pattern emerged. Based on these results, it could be advised to consider multi-channel information spreading.

The question of a public meeting about natural risks was then considered. Respondents were asked if they would attend such an event if it was held in the coming months in their community.

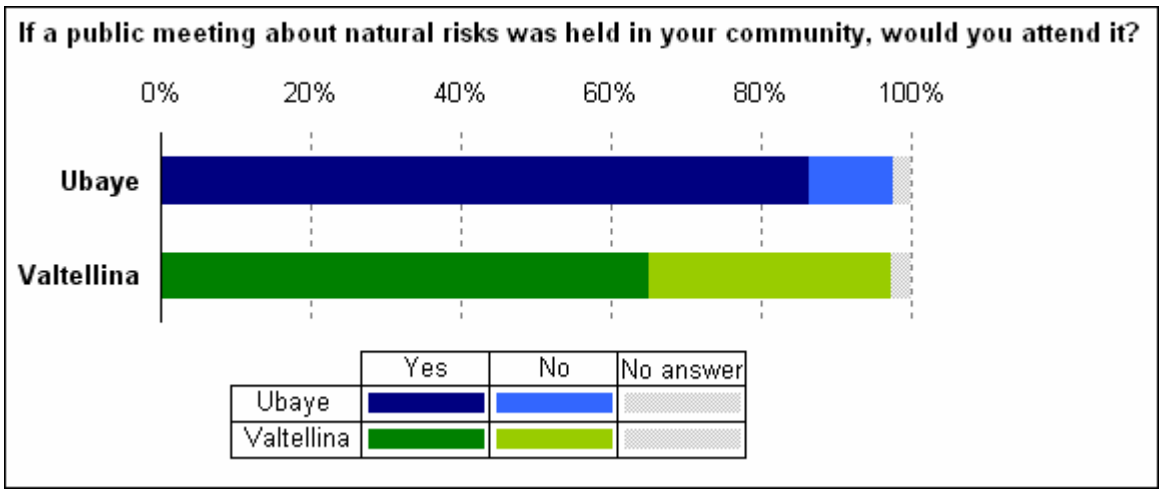


Figure 61. Intention to attend a public meeting about natural risks

The distribution of answers shows a strong interest for such participative meetings, where information is not only passed but discussed. Again, this is in line with previous answers about the perceived level of knowledge and the solicitation of more information. This was moreover confirmed by the attendance to the public meetings organised (see chapter 3.4.4).

No significant difference was observed when analysing the results by group.

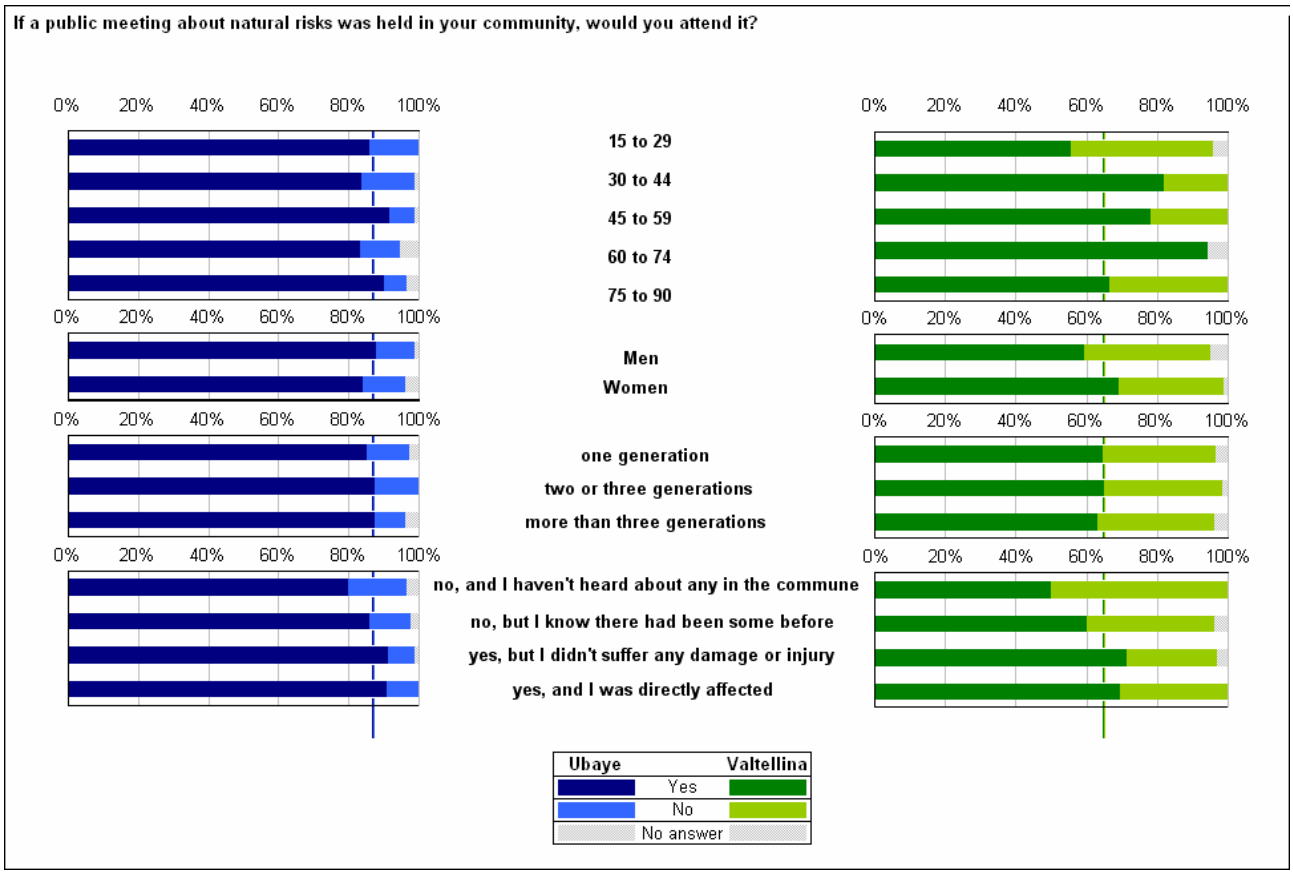


Figure 62. Compared distribution by group - Intention to attend a public meeting about natural risks

Topics of information

As one of the objectives of this survey was to allow authorities and stakeholders to understand better the concerns of the population, the question of topics of information seemed crucial. Here respondents were presented with a series of natural risks related topics on which they could receive information from various sources. Each topic was presented in a short sentence, and illustrated by at least two examples. They were asked to rate the importance of obtaining information on these topics, on a five level scale:

- 1 not important
- 2 slightly important
- 3 important
- 4 very important
- 5 crucial

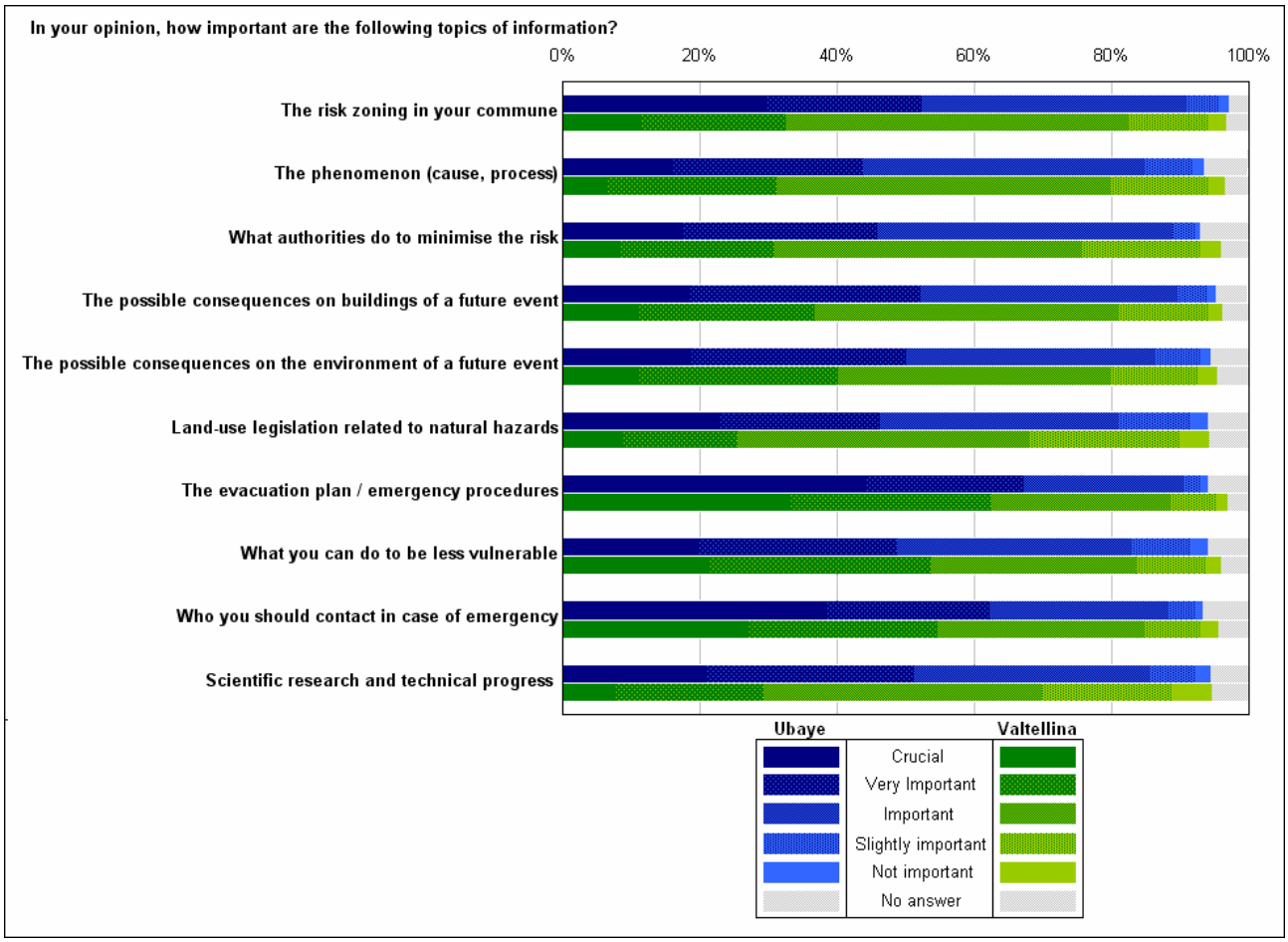


Figure 63. Rated interest of several topics of information

The distribution of answers (figure above) shows slight differences between the two case study sites. If both samples were primarily interested in very practical topic (evacuation and emergency procedures), the other highly ranked topics were different. In Valtellina, respondents were interested in individual mitigation measures they could take, while in Ubaye the topic of risk zoning was deemed more important. This probably indicates a lower involvement of individuals in mitigation in the Ubaye area.

It is interesting to note that, for any topic, the respondents in Ubaye showed more interest than the respondents in Valtellina. This remains in line with the general trend observed in the results, the Valtellina sample is less concerned and less eager to obtain more information than the Ubaye sample.

The results were then analysed for each topic by groups. The following figures present the results of this analysis. No significant difference was observed according to age, gender and ancientness. Experience with natural disasters, on the other hand, seems to influence the interests and concerns.

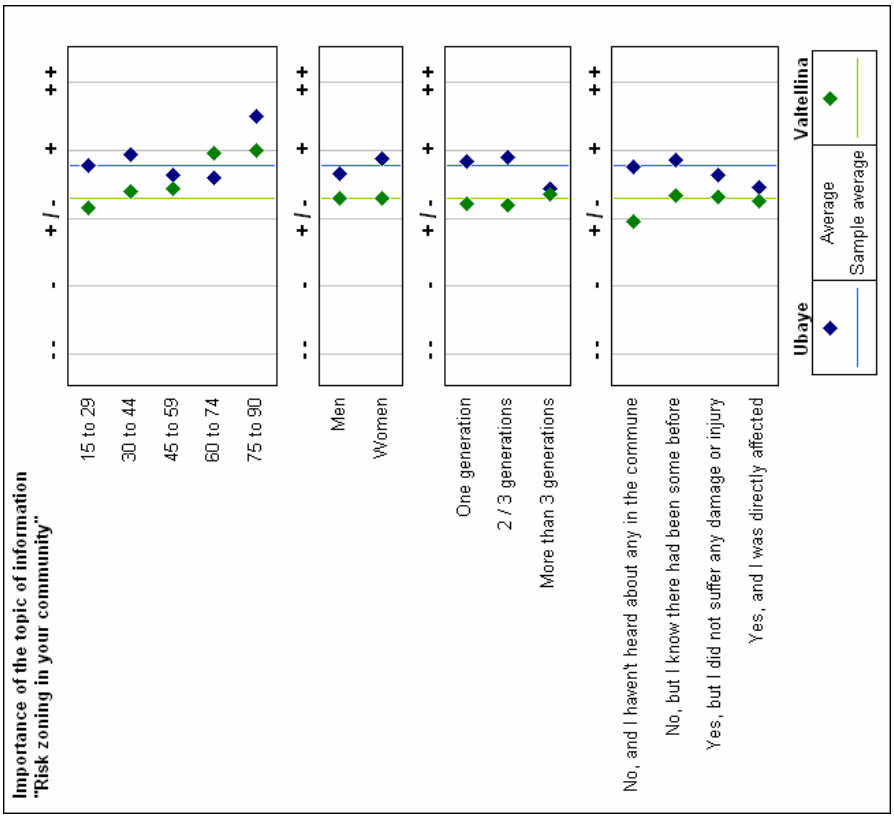


Figure 64. Comparison of average indices by group - Interest for information about risk zoning

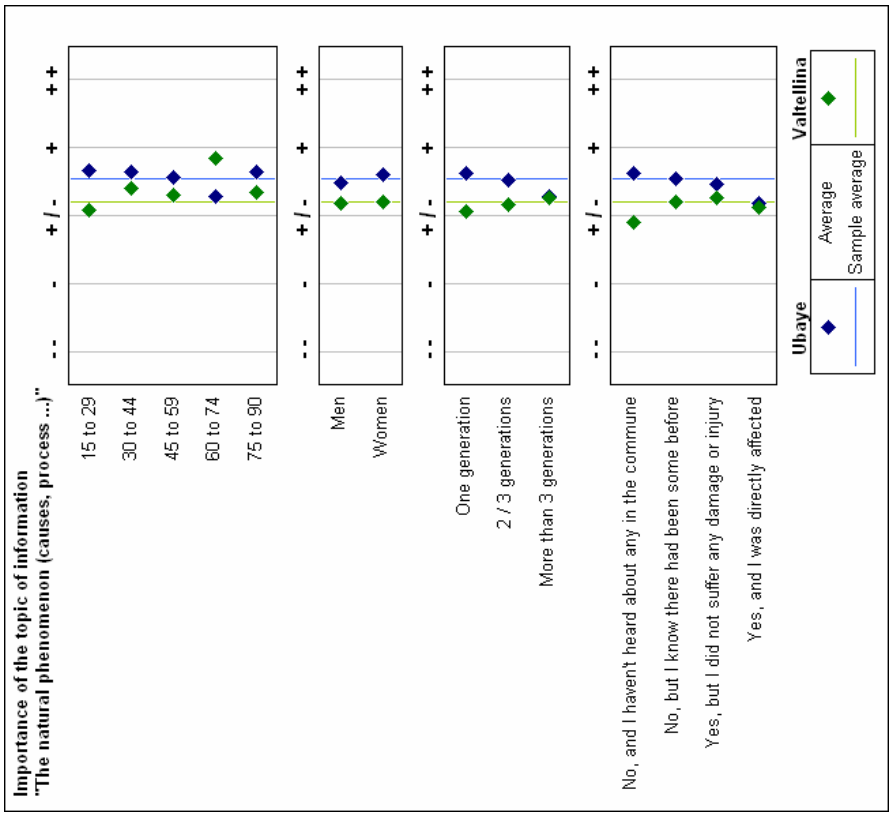


Figure 65. Comparison of average indices by group - Interest for information about the natural phenomenon

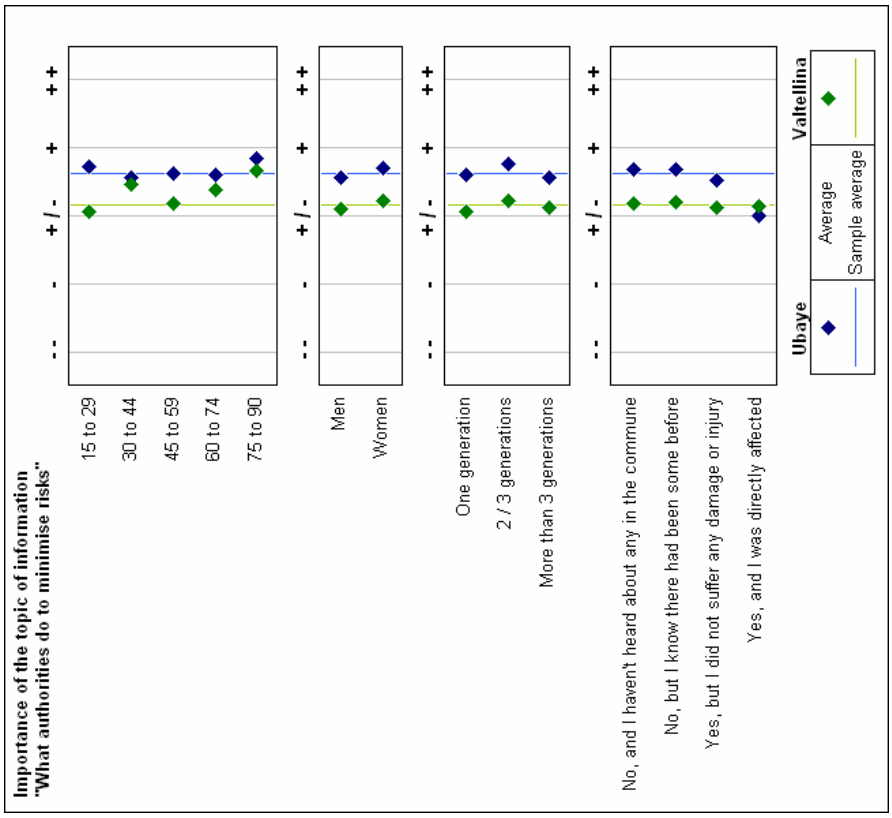


Figure 66. Comparison of average indices by group - Interest for information about mitigation actions taken by authorities

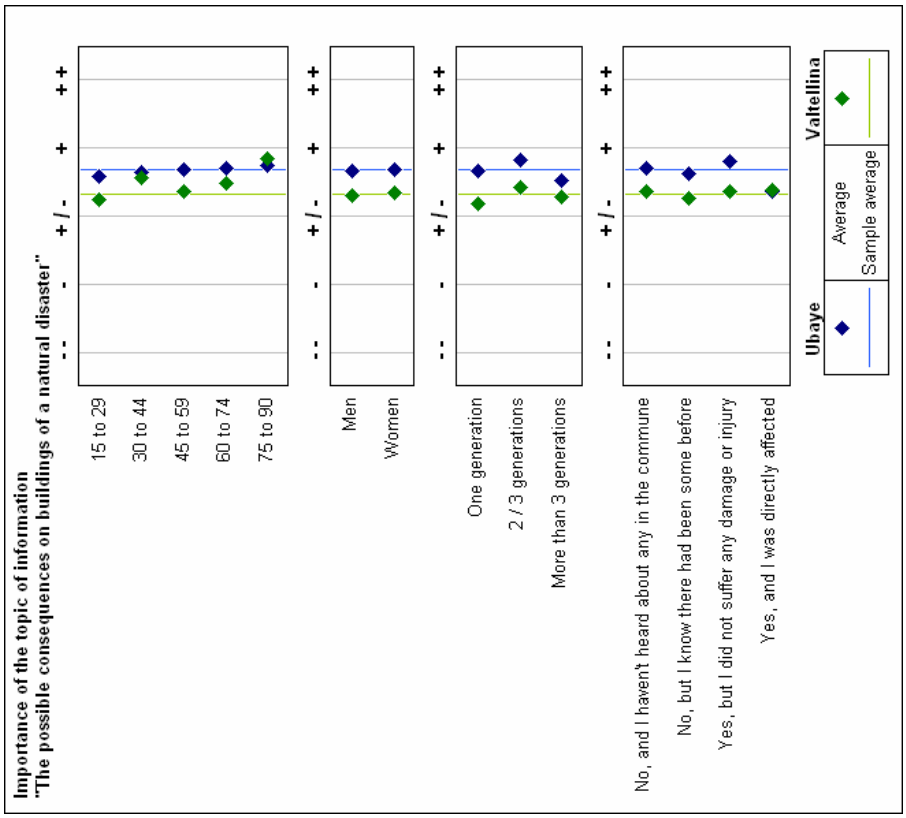


Figure 67. Comparison of average indices by group - Interest for information about physical consequences of disasters

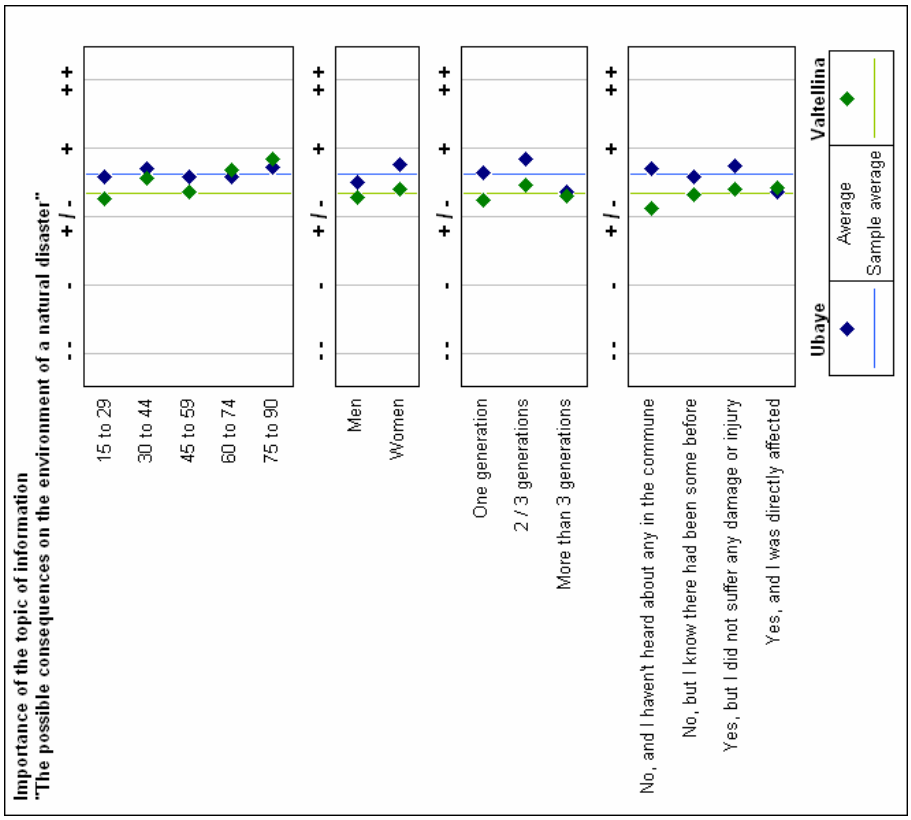


Figure 68. Comparison of average indices by group - Interest for information about consequences on environment of disasters

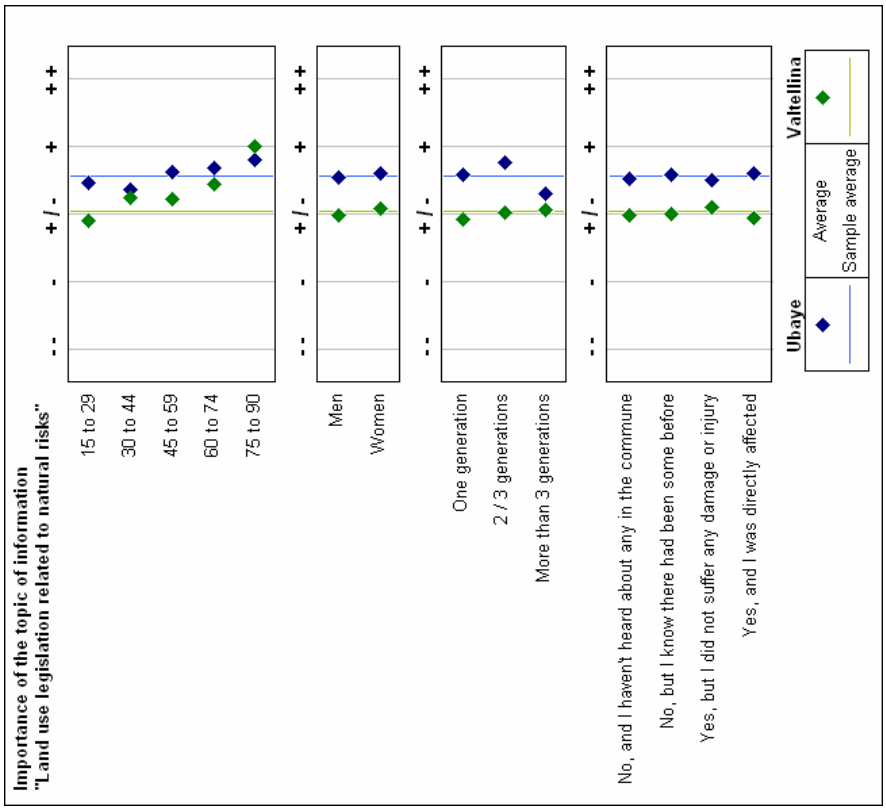


Figure 69. Comparison of average indices by group - Interest for information about land use legislation

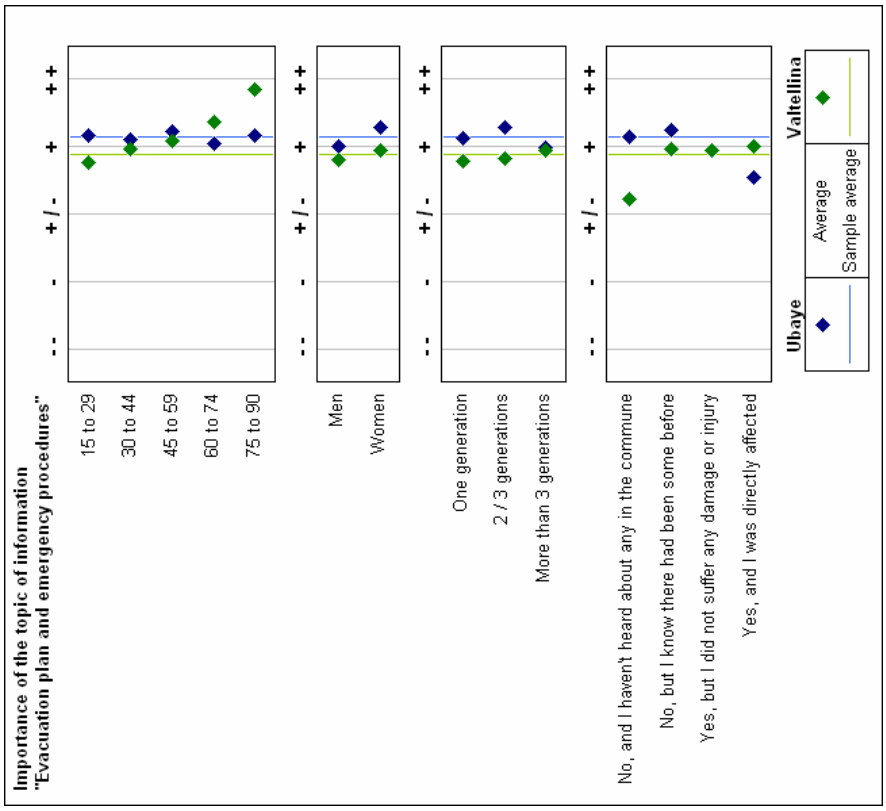


Figure 70. Comparison of average indices by group - Interest for information about emergency procedures

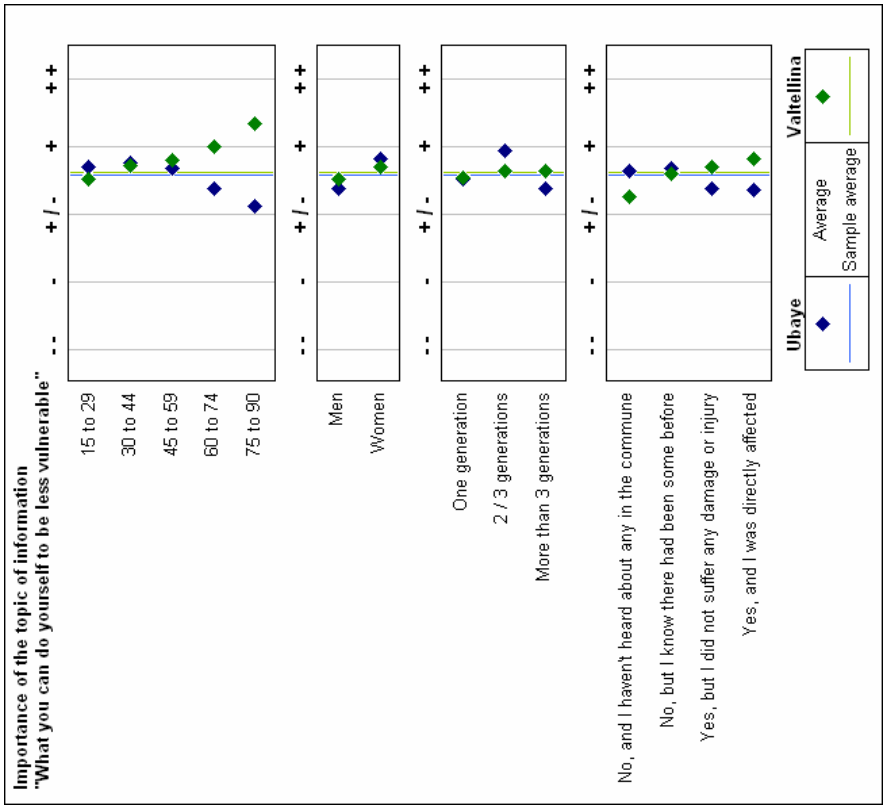


Figure 71. Comparison of average indices by group - Interest for information about possible individual mitigation measures

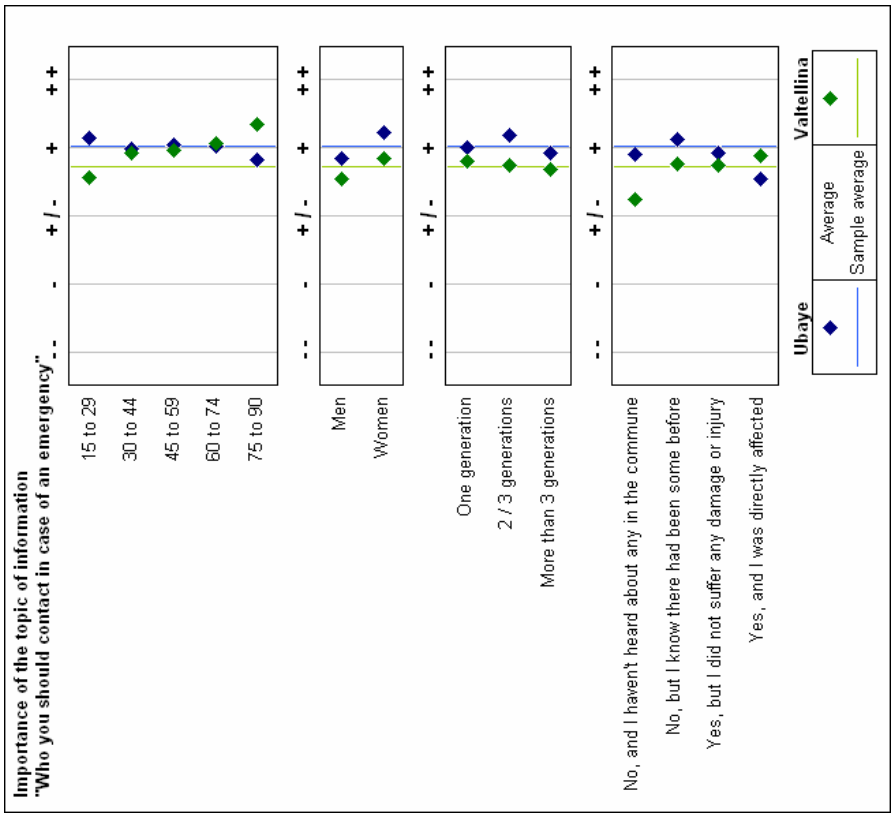


Figure 72. Comparison of average indices by group - Interest for information about emergency contact

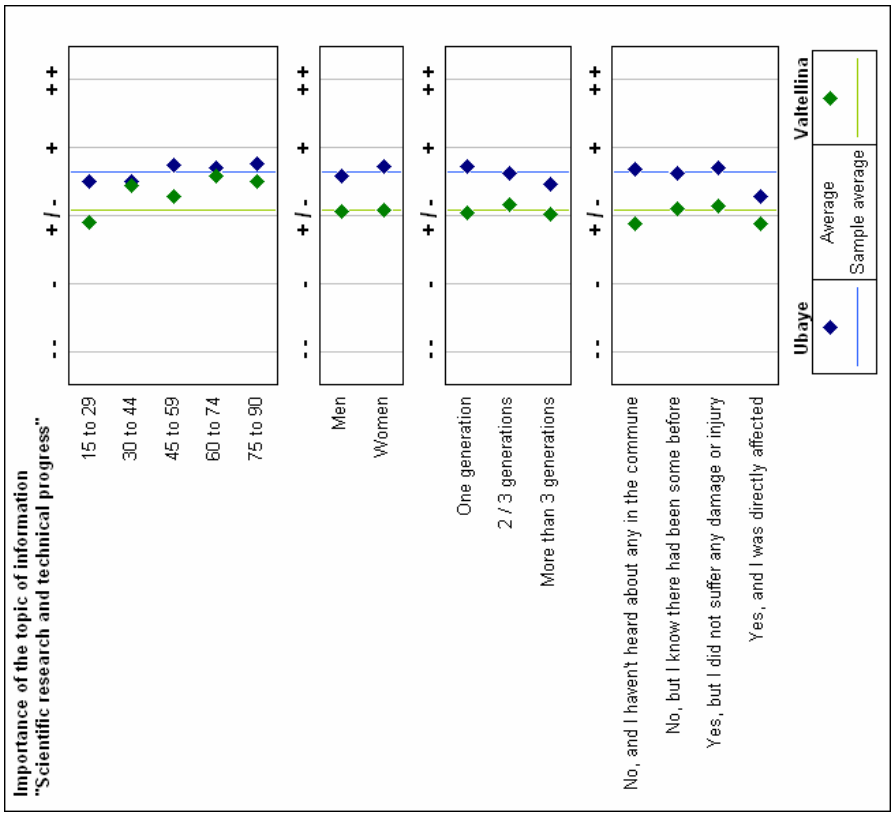


Figure 73. Comparison of average indices by group - Interest for information about scientific research and techniques

In the Ubaye sample, respondents who experienced disasters without being personally affected were concerned about the physical consequences (on buildings and infrastructures), whereas

those who suffered injuries and/or damages were more interested in the land use legislation enforced. This could be partly explained by local conflicts and polemics that raised after the debris flows in 2003. Several properties were damaged, and experts (technicians and scientists) were not surprised of this, as they were located directly downstream of a torrent known to be prone to such phenomena. Nevertheless, these rather recent constructions had been built in total compliance with land use legislation and restrictions. After this, citizens questioned the pertinence of land use documents, and the actual interests at play.

In the Valtellina sample also, the experience of natural disasters shapes the interest for different topics. Respondents who never experienced disasters showed more interest for information about physical consequences (on buildings and infrastructures) when other groups ranked emergency procedures first. Perhaps this interest stems from a perceived lack of information about actual effects of disasters, and a willingness to understand what could happen.

Actors of risk governance

The last series of questions of this survey concerned the different actors of risk governance. The aim was to apprehend the feelings of respondents towards specific types of actors:

- Authorities, at different levels: commune, community, province, region, state
- Actors of response and emergency: civil protection
- Actors of recovery and mitigation: insurance
- Actors of knowledge creation: technical experts and scientists
- Vector of information: media

Different topics were investigated: trust, perceived level of knowledge, perceived level of preparedness, legitimacy as informing actor.

Assessing trust as a whole would have required deeper questioning and interviews, and would still be very complex. It was decided to focus on one of the aspects of trust, the credibility and trust accorded to information. People might question decision based on information they deem unreliable or partial.

Here, trust in information communicated by several actors was assessed on a five level scale:

- 1 no trust at all in information communicated by this actor
- 2 little trust in information communicated by this actor
- 3 fairly trusting information communicated by this actor
- 4 trusting a lot information communicated by this actor
- 5 completely trusting information communicated by this actor

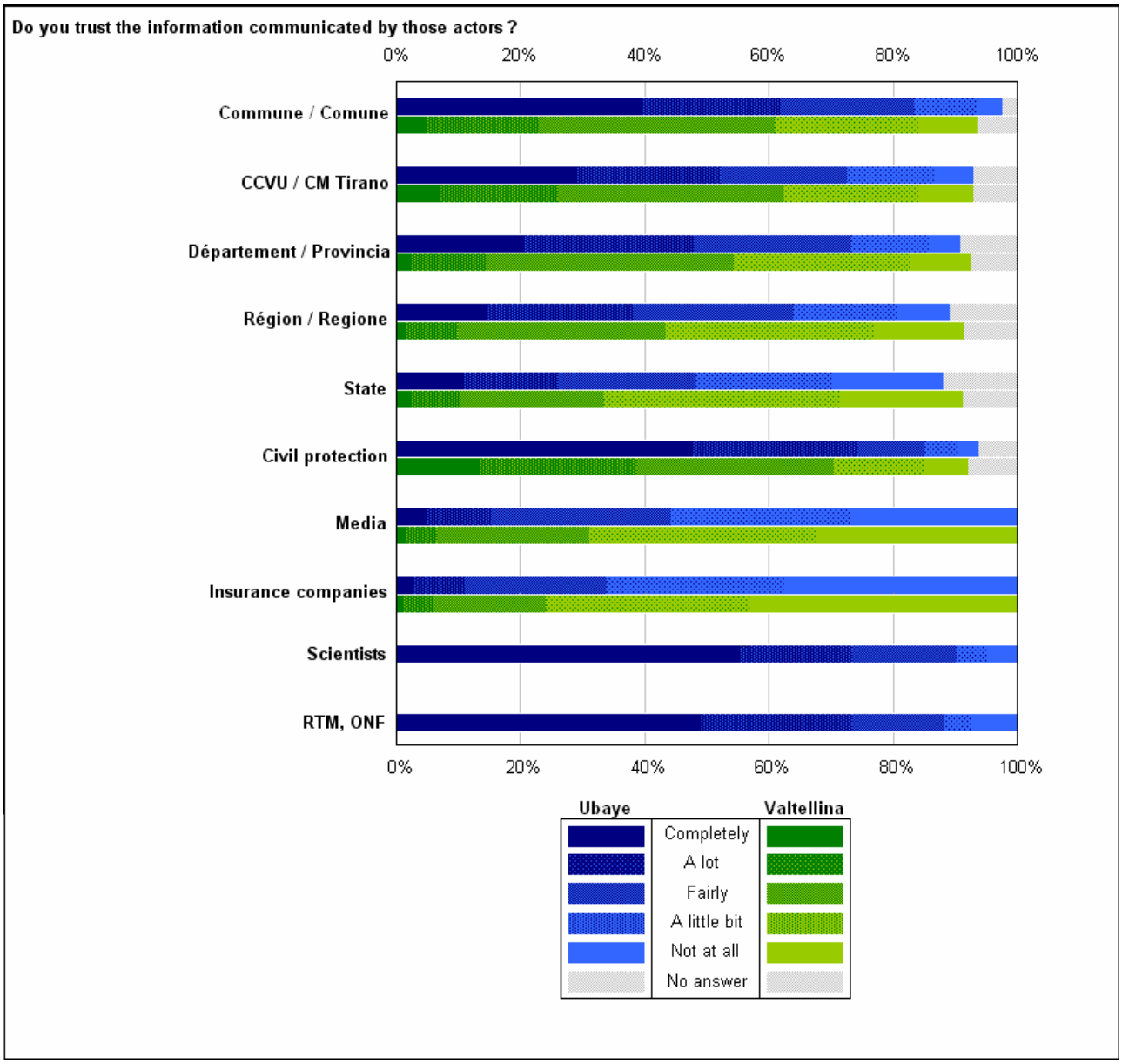


Figure 74. Trust in different actors of risk governance

These answers were then cross analysed with groups, and the results of this analysis are shown in figures below.

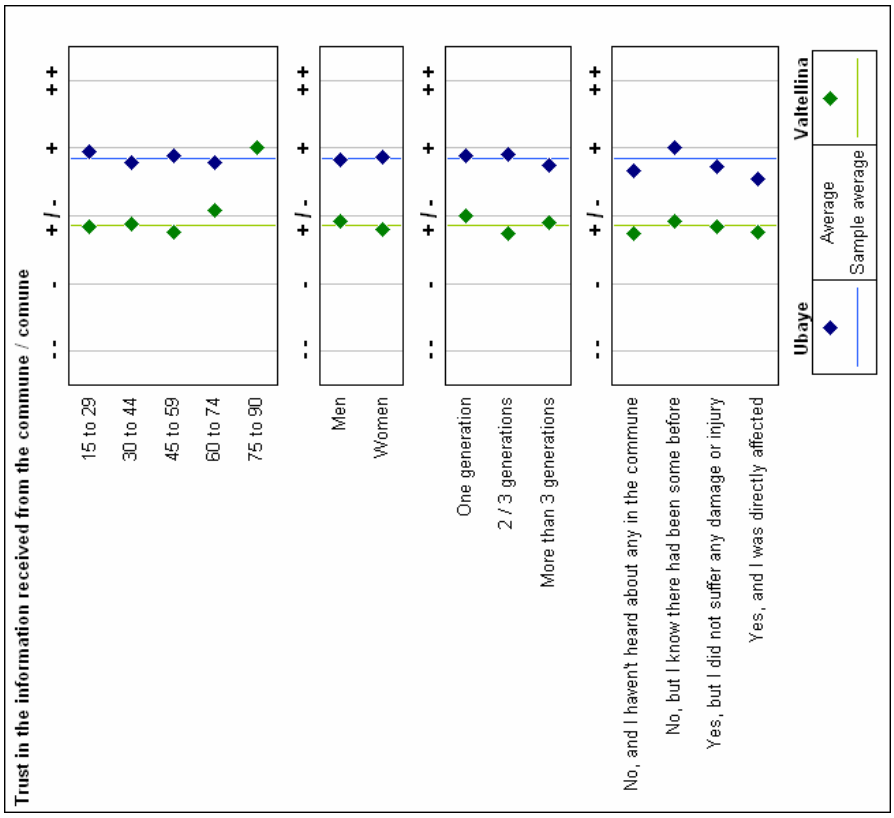


Figure 75. Comparison of average indices by group - trust in the municipalities

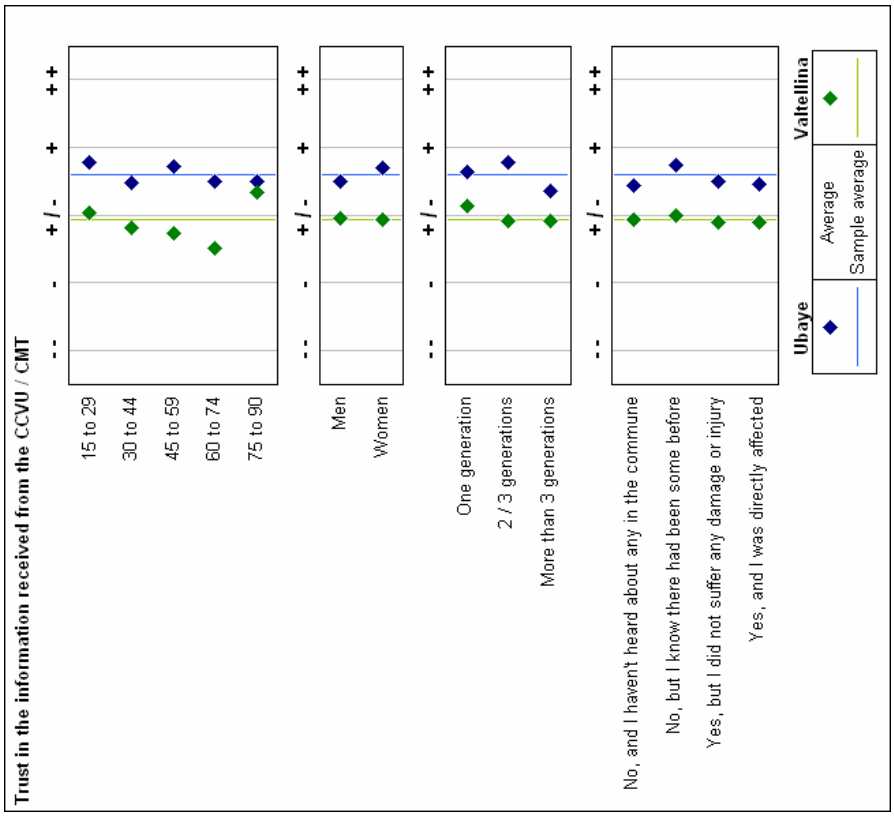


Figure 76. Comparison of average indices by group - trust in intercommunalities

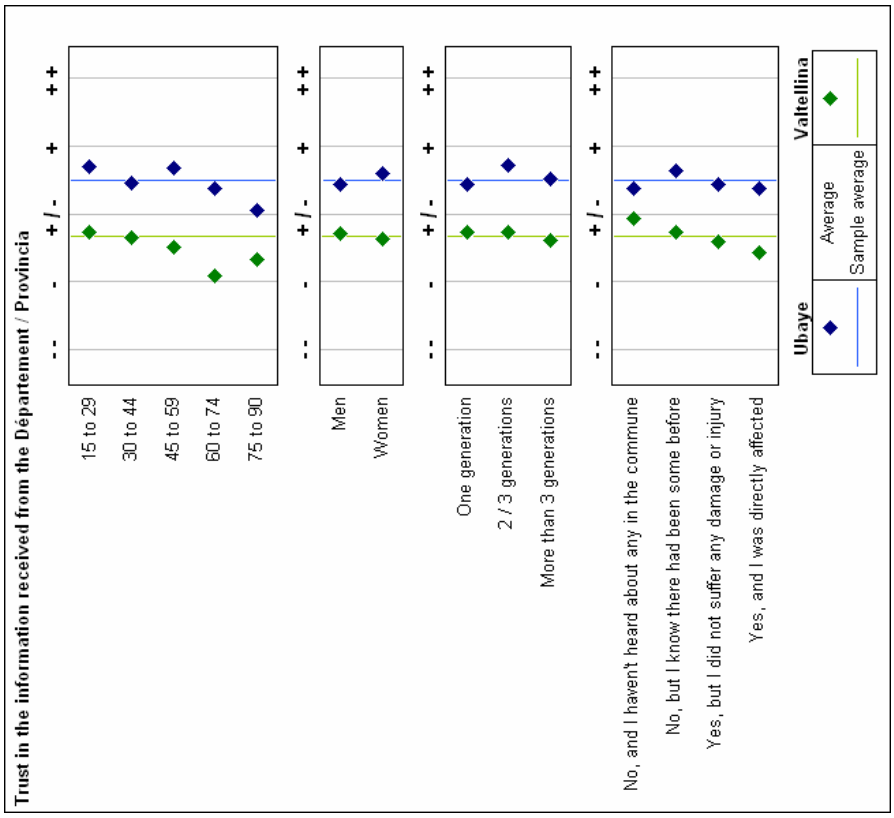


Figure 77. Comparison of average indices by group - trust in province authorities

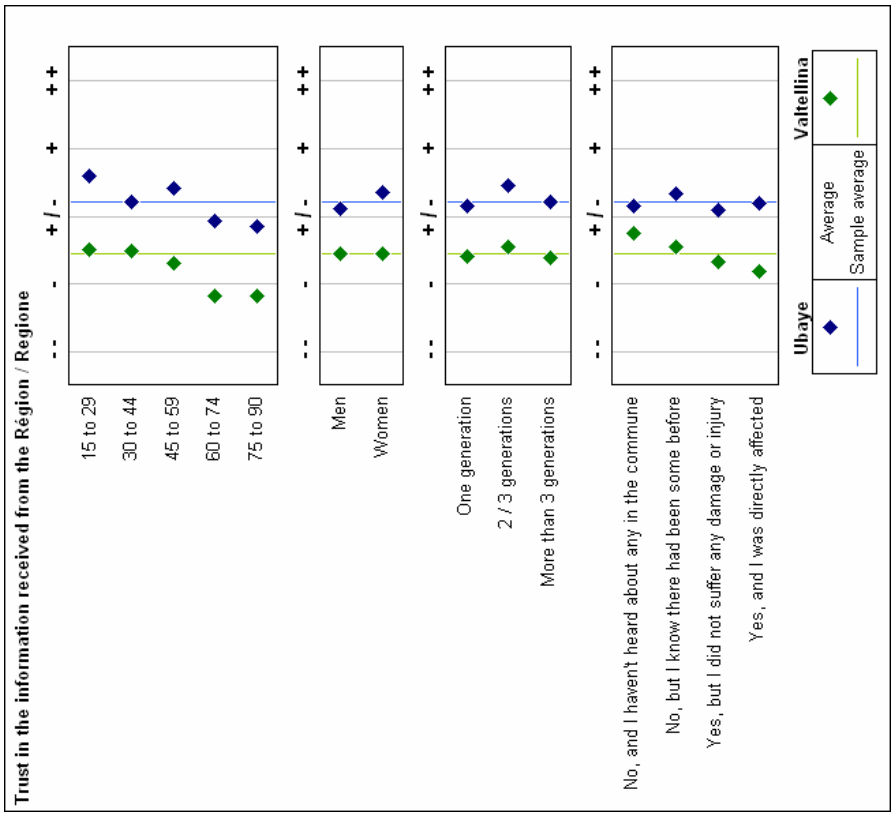


Figure 78. Comparison of average indices by group - trust in regional authorities

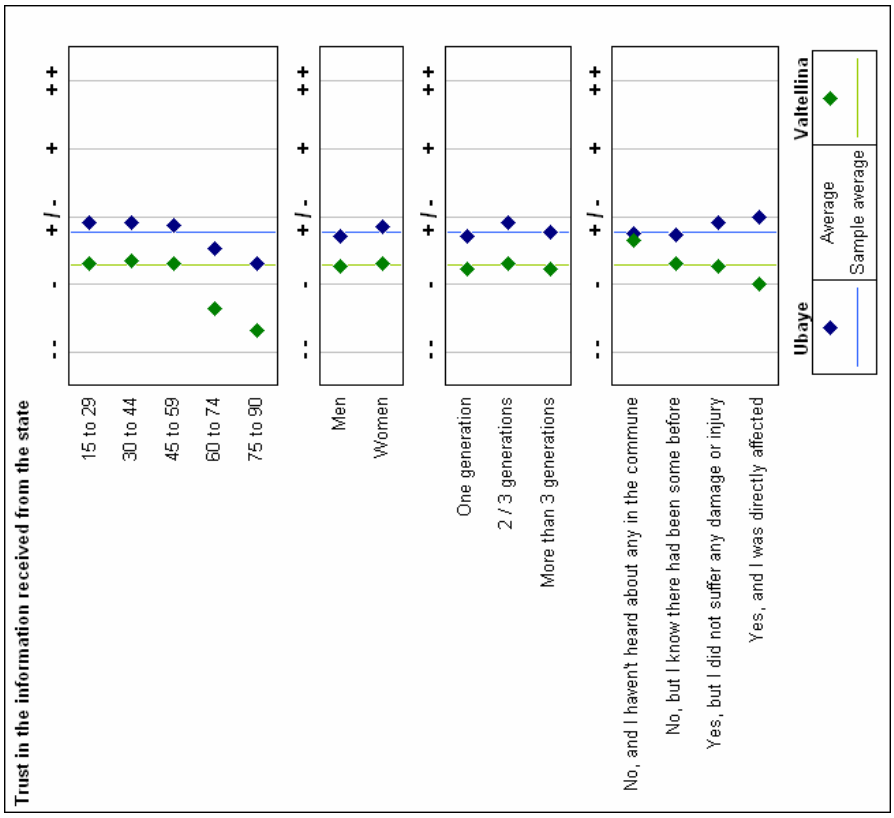


Figure 79. Comparison of average indices by group - trust in national authorities

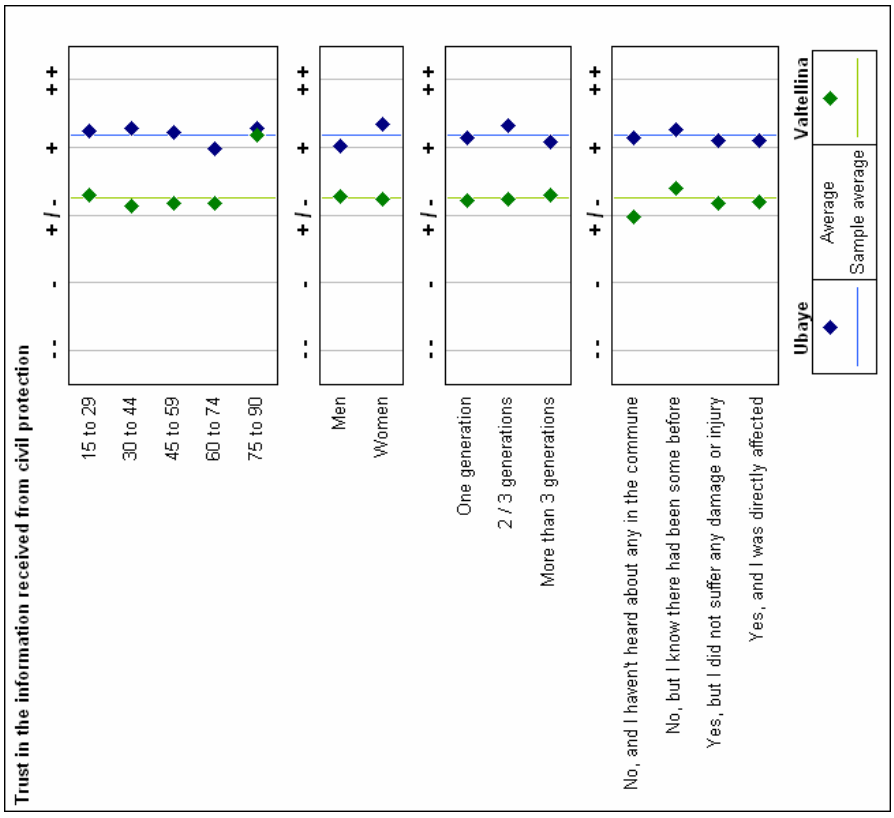


Figure 80. Comparison of average indices by group - trust in civil protection

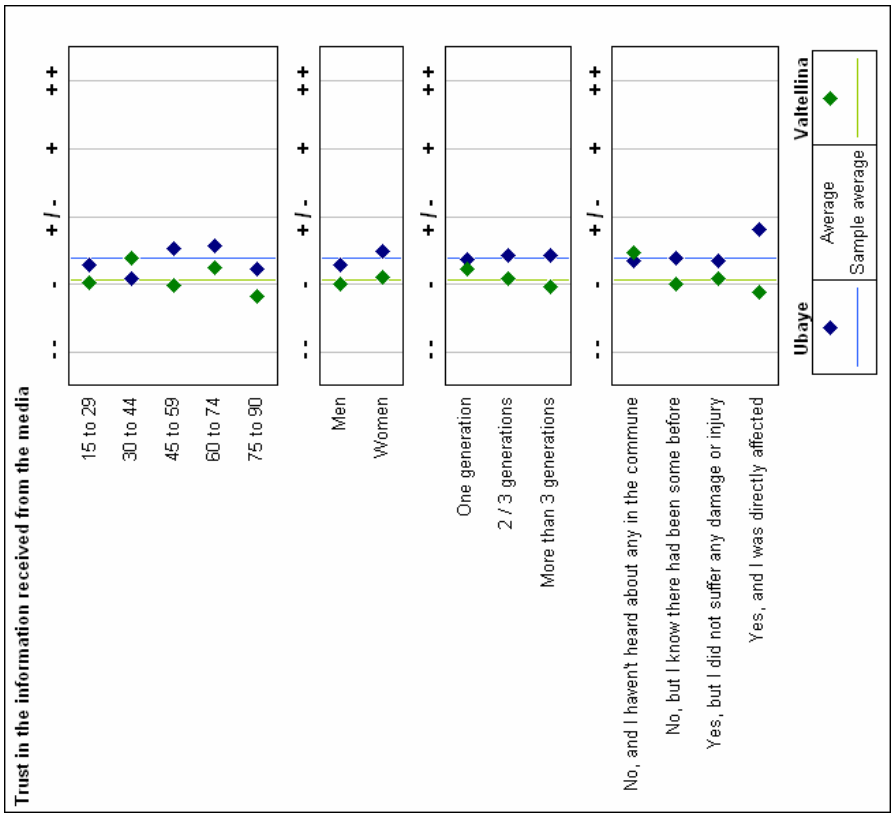


Figure 81. Comparison of average indices by group - trust in mass media

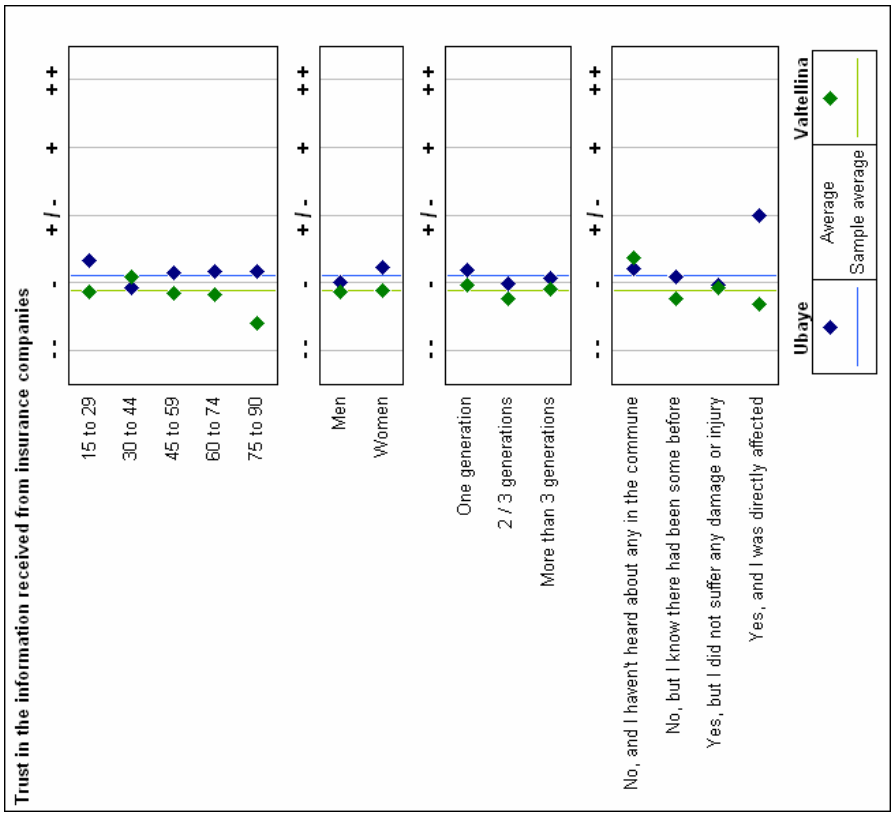


Figure 82. Comparison of average indices by group - trust in insurance companies

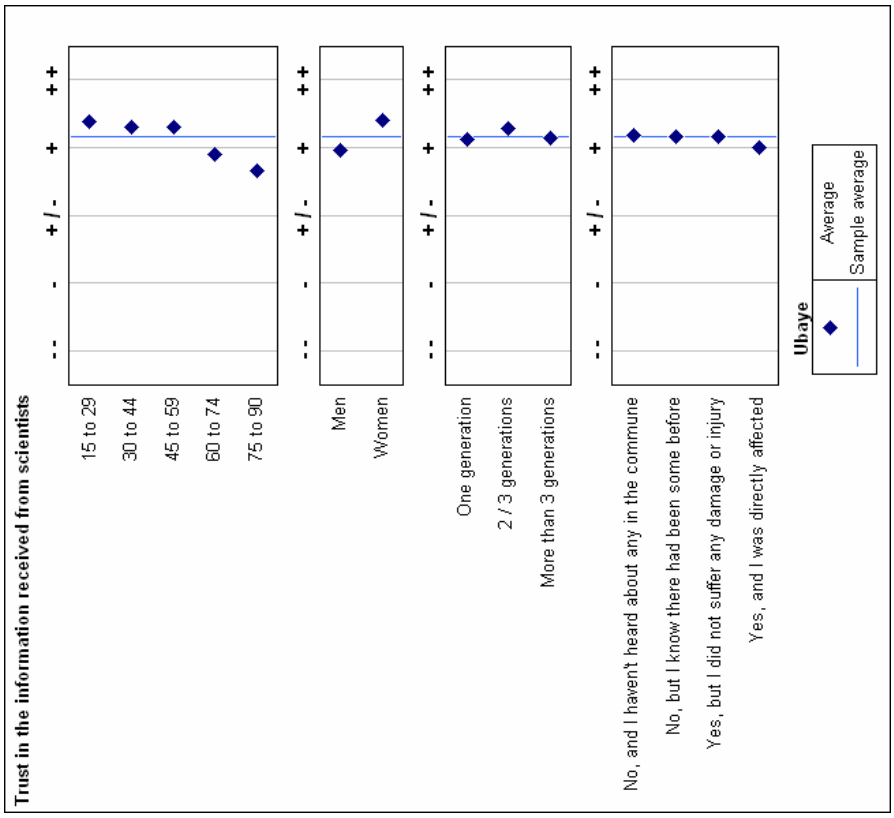


Figure 83. Comparison of average indices by group - trust in scientists

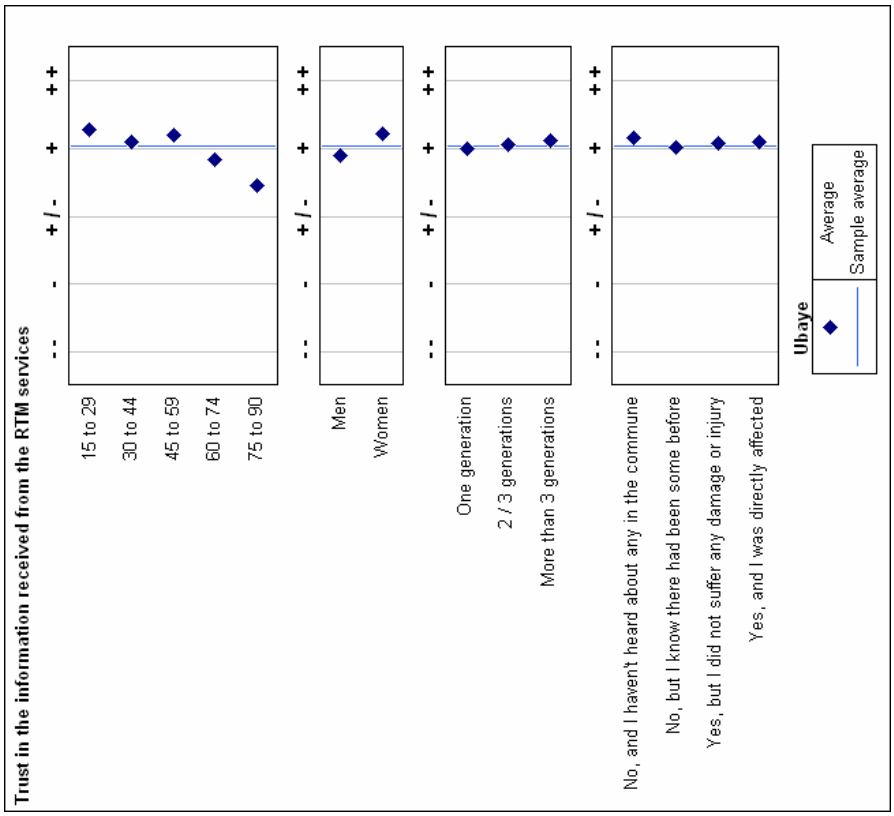


Figure 84. Comparison of average indices by group - trust in forest and mountains services

A clear pattern can be observed for both sites concerning trust in authorities: the more local, the more trusted. The confidence accorded to each level depends on its position on the scale. This is probably due to the fact that local authorities are supposed to have a better understansing of local specificities, when national authorities deal with a larger territory and cannot take into account all contexts. Moreover, actual field actors are deemed more trustworthy than authorities (civil protection in Valtellina, RTM services in Ubaye).

In both cases insurance companies and media are at the end of the list, they appear to be unreliable or partial in their communication. This is interesting, as media were solicited in both case study areas as a vector of information. Respondents seem to be aware of possible biases in information provided in the media, and will not naively accept all discourse.

In the Ubaye sample though, respondents who were personally affected by a natural disaster gave more credit to insurance companies than others. This could maybe be explained by a rather positive experience with insurances after the disaster.

Respondents were then asked which actor should inform them about risks. This was not only based on trust, but also on actual responsibilities.

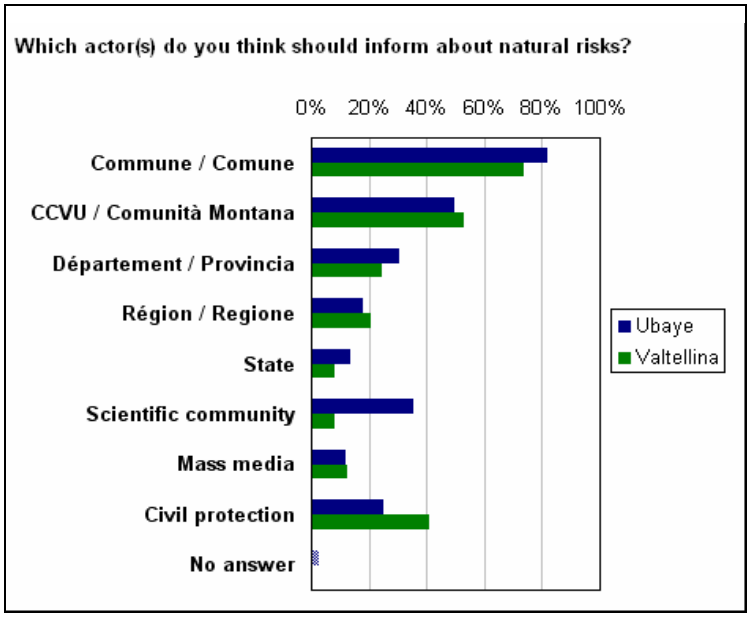


Figure 85. Actors solicited for information

Clearly in both cases local authorities are the more relevant actor for informing about natural risks, which is logical, as they are responsible for safety of citizens. They are followed in the Valtellina sample by civil protection, the main actor of response. In the Ubaye sample, scientists are

solicited. Indeed, the role of civil protection is less pregnant there and a large community of scientists has been working in the area for twenty years.
No significant pattern of distribution of answers by group was observed (the results of cross analyses are available in annex).

The next question addressed the perceived level of knowledge of governance actors about natural risks. This time, respondents and their families were included in the list. Respondents were asked to evaluate how well each actor knows risks on a five level scale:

- 1 very poorly
- 2 poorly
- 3 sufficiently
- 4 well
- 5 very well

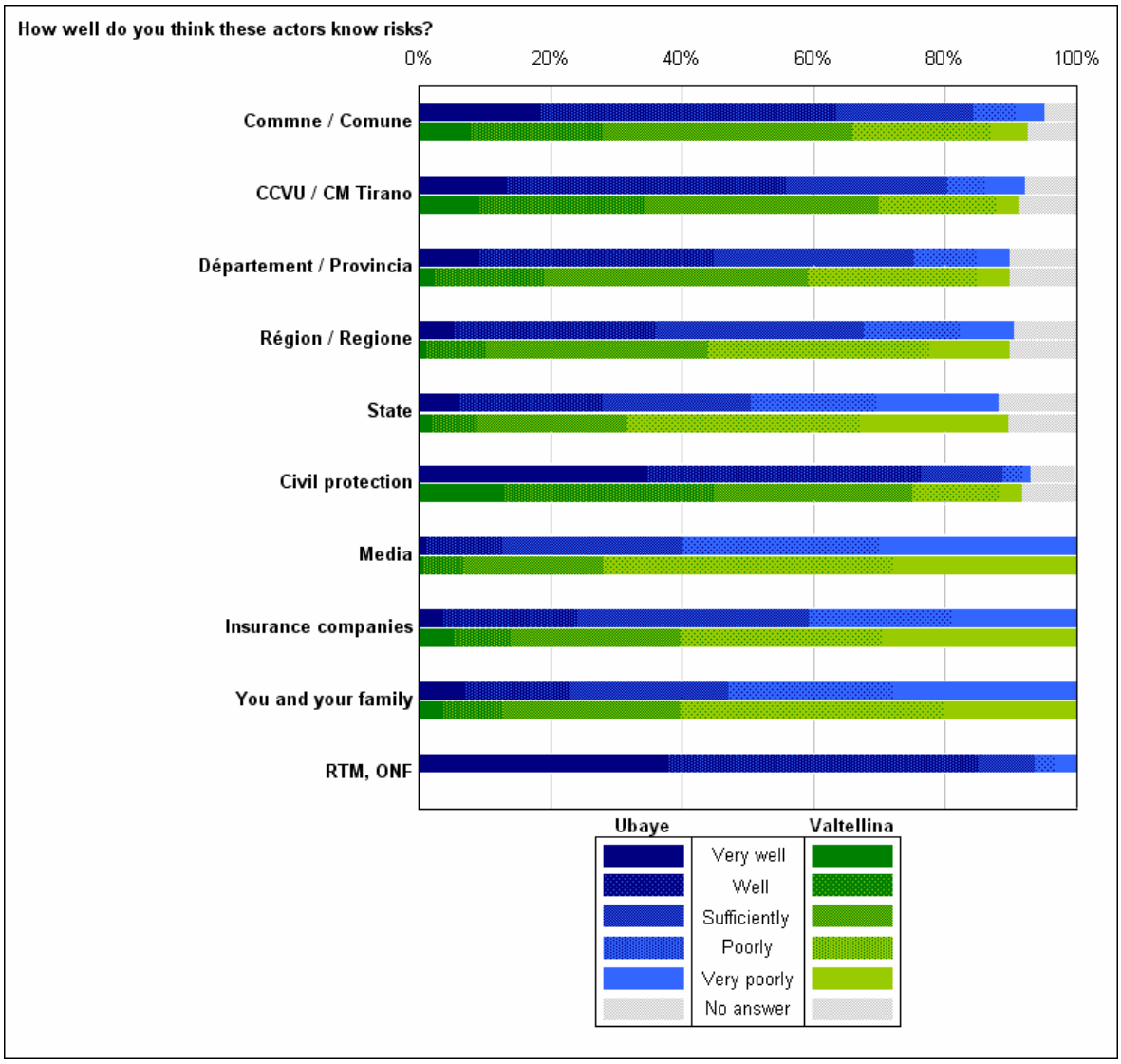


Figure 86. Estimated knowledge of actors of risk governance

In both cases the actors seen as more knowledgeable were civil protection and municipality, as well as local technicians for the Ubaye sample (no equivalent of the RTM services exist in Valtellina). The bottom of the list differs. In Ubaye insurance companies and the respondents themselves were seen as the less knowledgeable (thus keeping in line with the observed trend that respondents felt insufficiently informed expressed in previous questions). In Valtellina media and state are seen as less knowledgeable, perhaps because they address natural risks at a larger scale, not focusing on a particular territory.

The answers were then analysed for each actor by groups. The results (see figures below) show no significant pattern, but were nevertheless included in the reports provided to local autorities and stakeholders to illustrate how the population perceives them (see chapter 3.4.4).

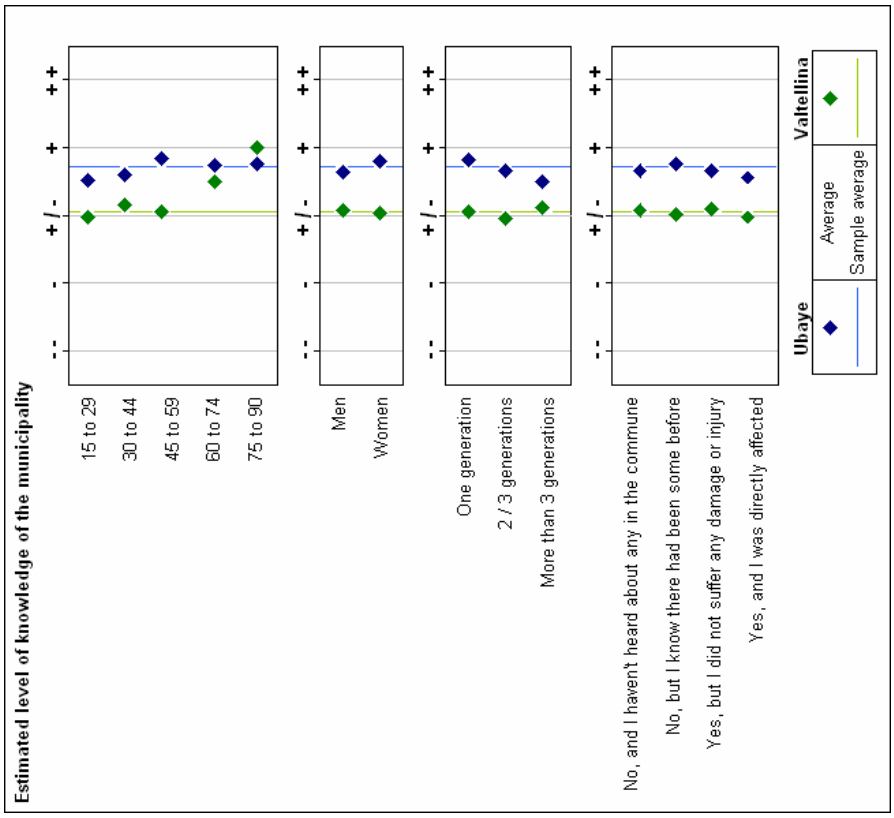


Figure 87. Comparison of average indices by group - estimated knowledge level of the municipalities

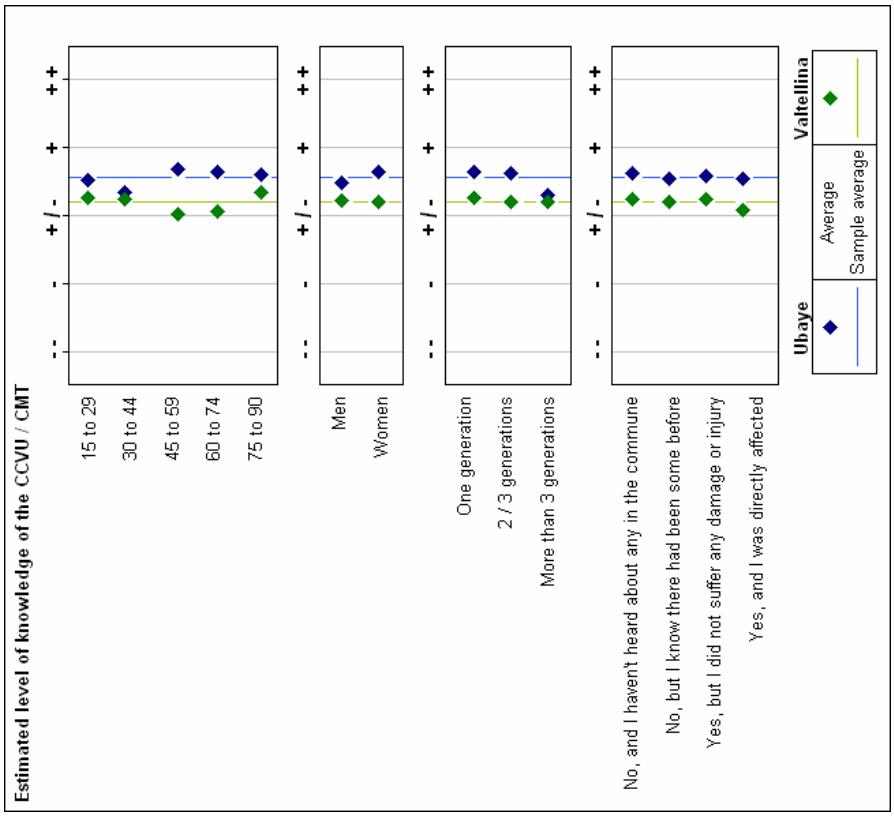


Figure 88. Comparison of average indices by group - estimated knowledge level of intercommunalities

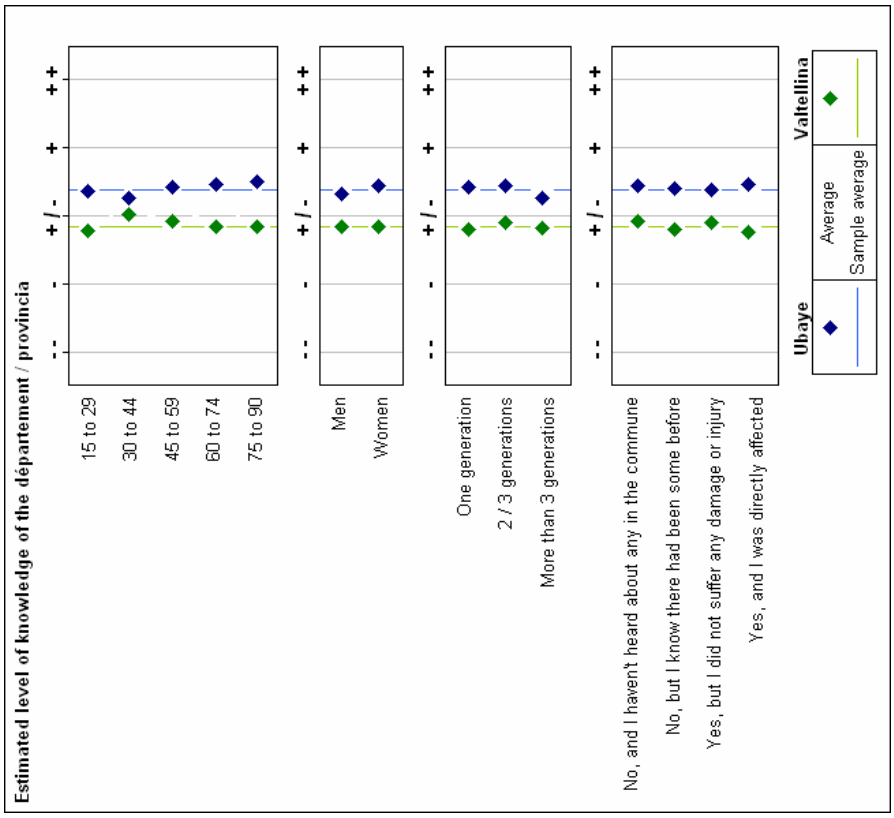


Figure 89. Comparison of average indices by group - estimated knowledge level of province authorities

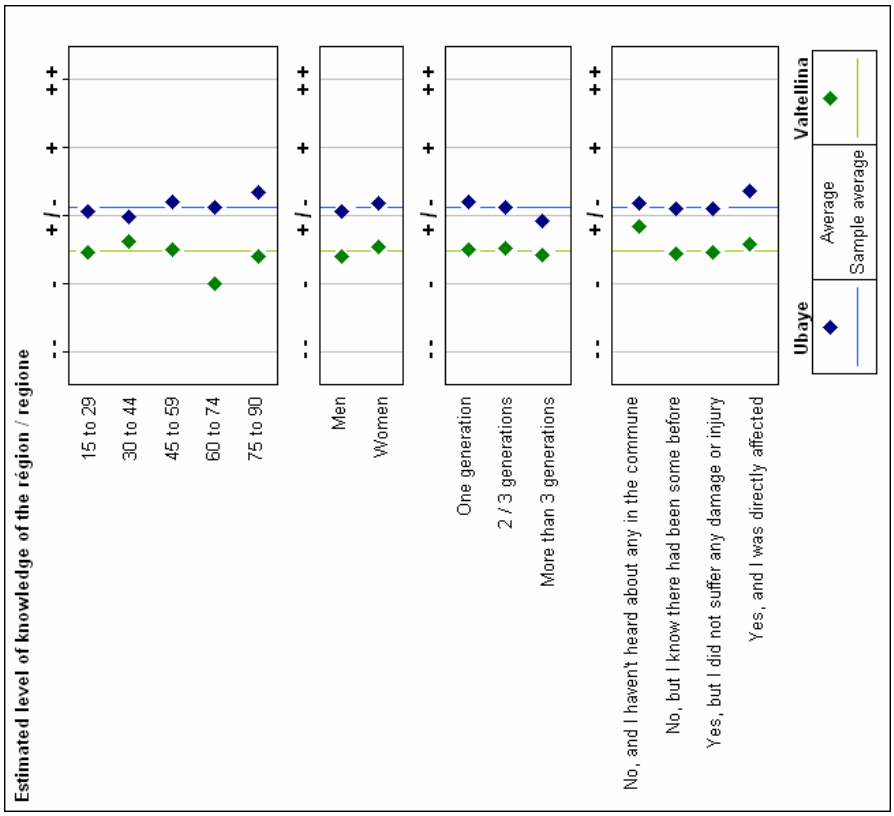


Figure 90. Comparison of average indices by group - estimated knowledge level of regional authorities

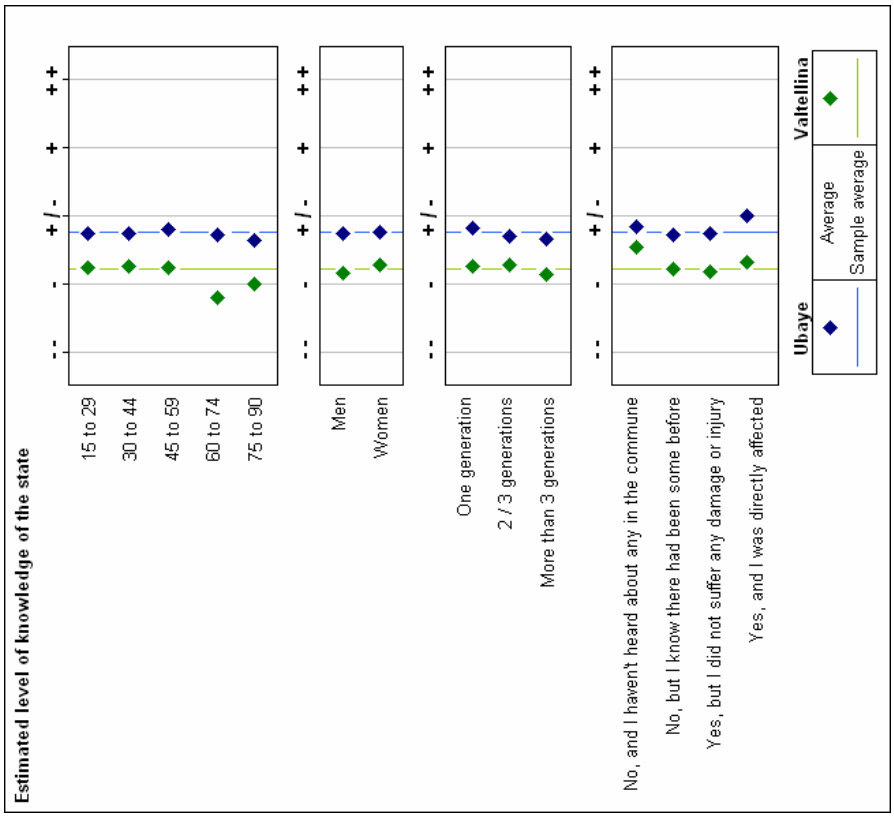


Figure 91. Comparison of average indices by group - estimated knowledge level of national authorities

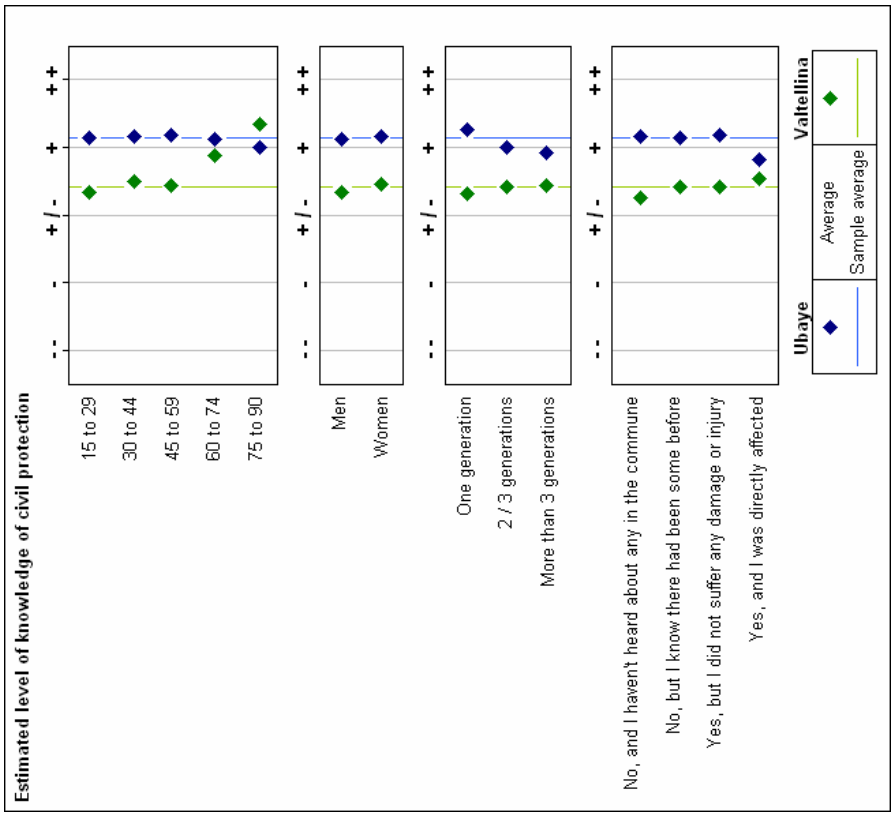


Figure 92. Comparison of average indices by group - estimated knowledge level of civil protection

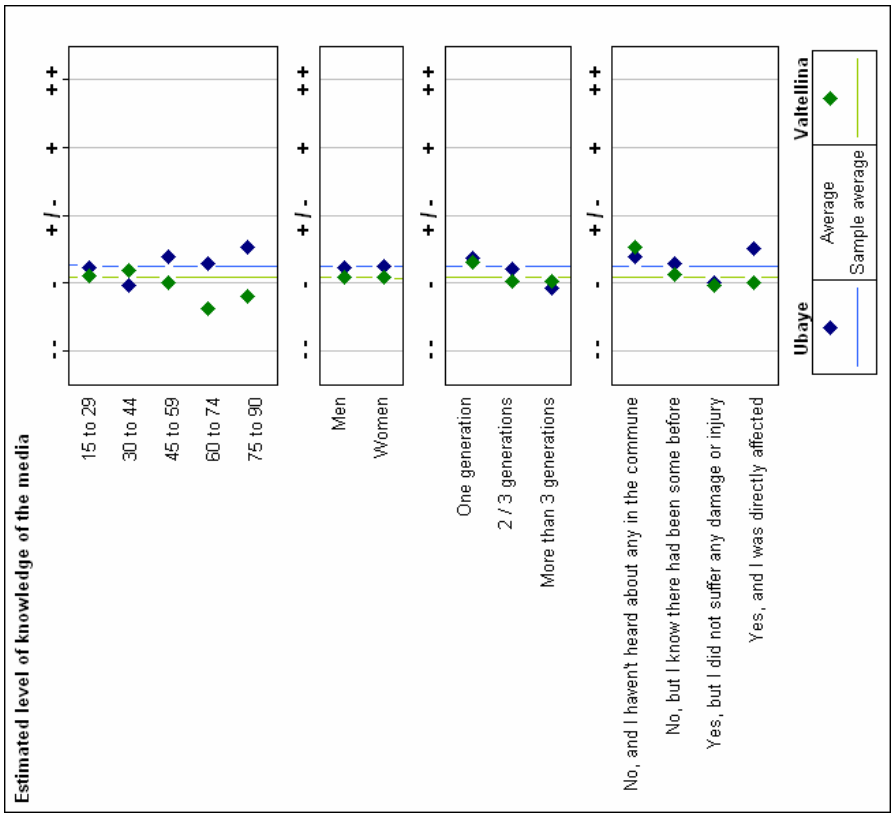


Figure 93. Comparison of average indices by group - estimated knowledge level of mass media

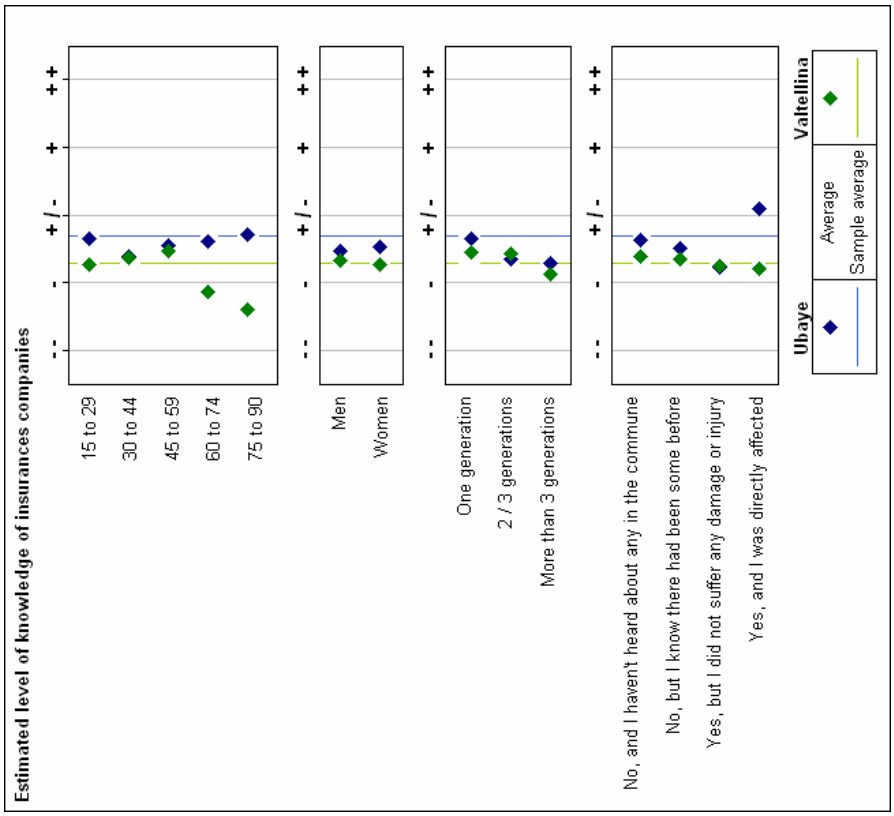


Figure 94. Comparison of average indices by group - estimated knowledge level of insurance companies

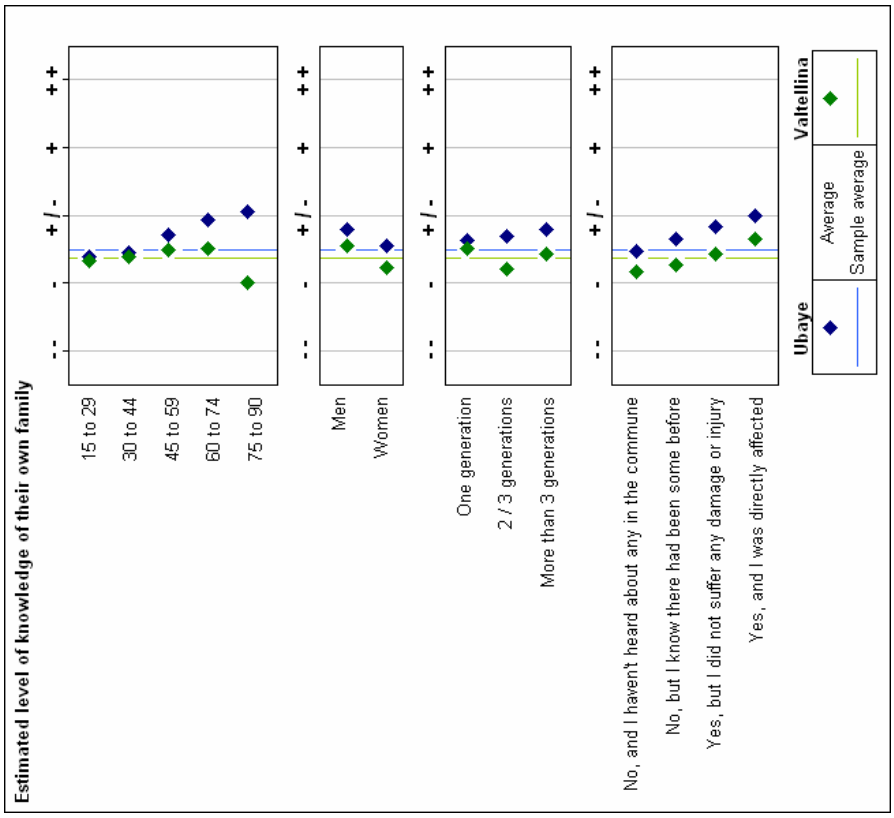


Figure 95. Comparison of average indices by group - estimated knowledge level of respondents' households

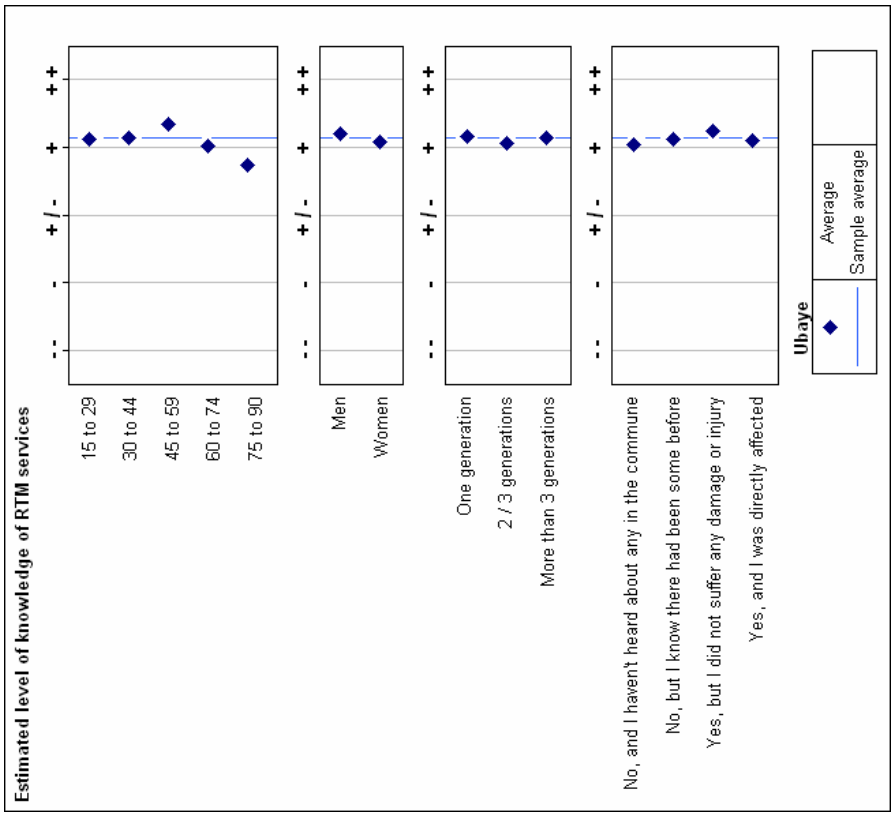


Figure 96. Comparison of average indices by group - estimated knowledge level of forests and mountains services

The last question in this series aimed to assess the perceived level of preparedness of actors of risk governance. Respondents were asked to evaluate how well each actor (again including themselves) is prepared to react in case of a disaster happening tomorrow, on a five level scale:

- 1 very poorly prepared
- 2 poorly prepared
- 3 sufficiently prepared
- 4 well prepared
- 5 very well prepared

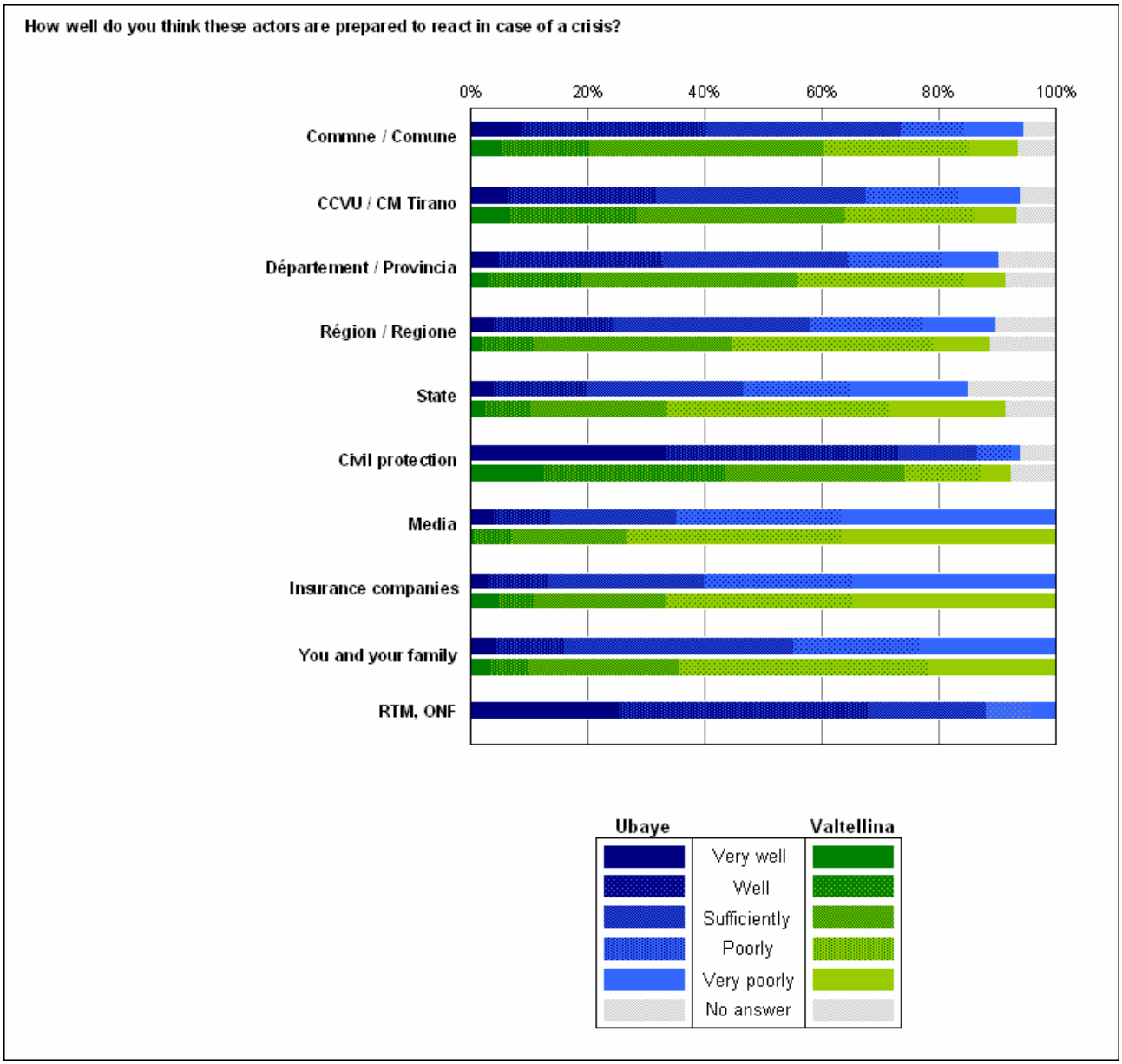


Figure 97. Estimated level of preparedness of governance actors

The distribution of answers, as seen on the figure above, is very similar to the previous question. Again civil protection and local key actors (RTM in Ubaye, Comunità Montana in Valtellina) are seen as the most prepared.

The less prepared actors, in both sites, were media and insurance companies.

Answers were then compared, for each actor, by groups. The figures below illustrate these comparisons. As for the previous question, no trend or pattern emerged, but the answers were nevertheless provided to authorities and stakeholders.

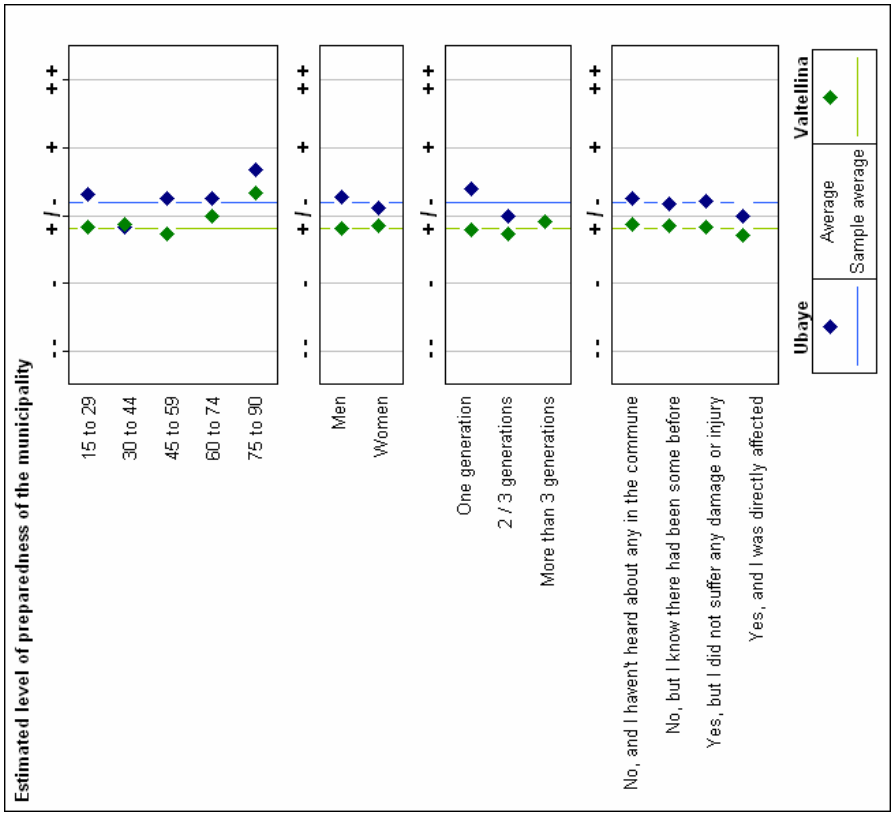


Figure 98. Comparison of average indices by group - estimated preparedness level of municipalities

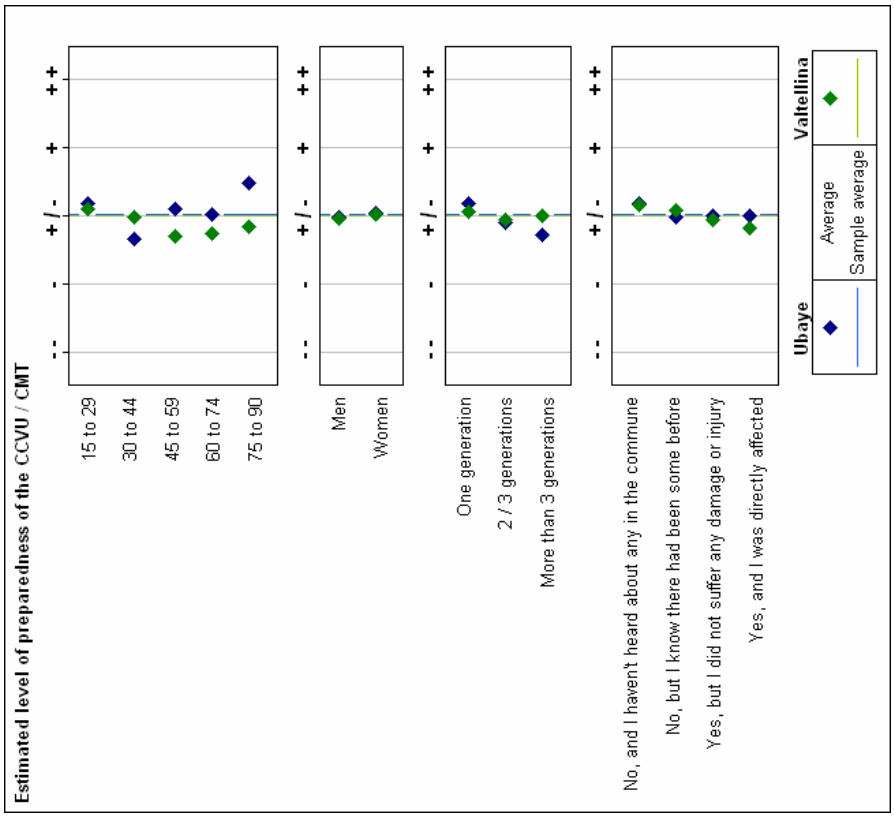


Figure 99. Comparison of average indices by group - estimated preparedness level of intercommunalities

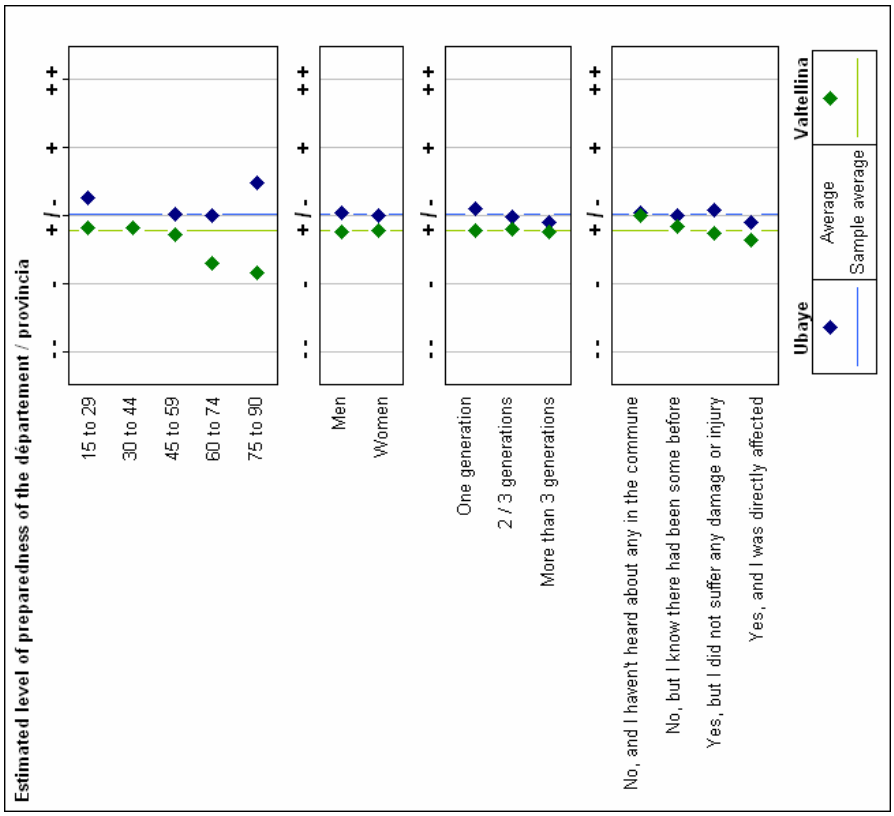


Figure 100. Comparison of average indices by group - estimated preparedness level of province authorities

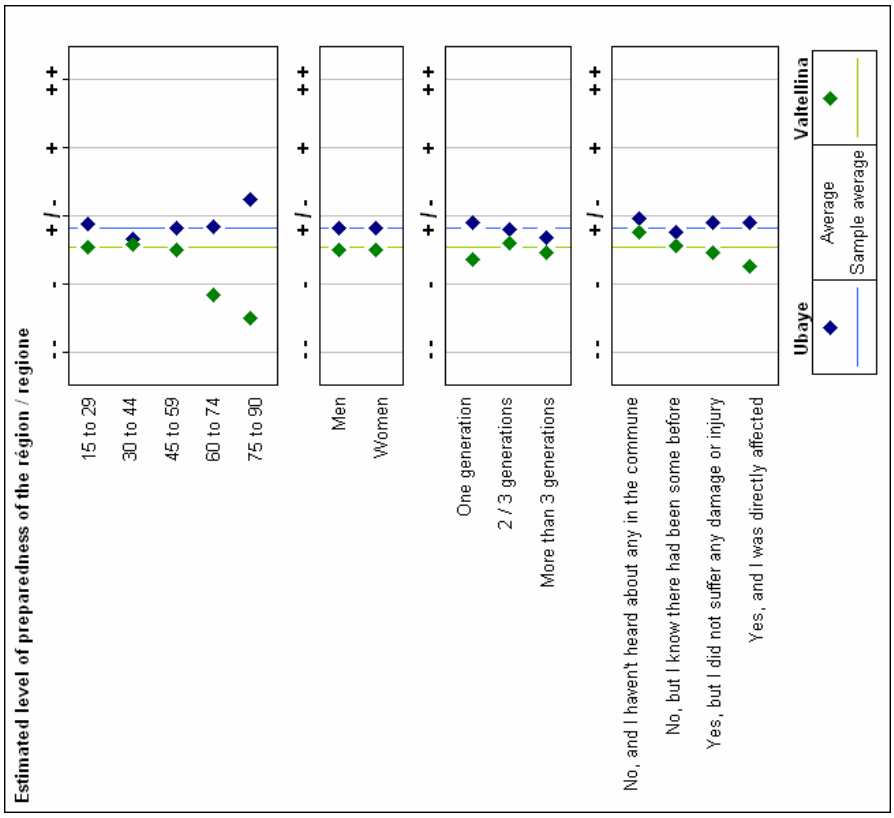


Figure 101. Comparison of average indices by group - estimated preparedness level of regional authorities

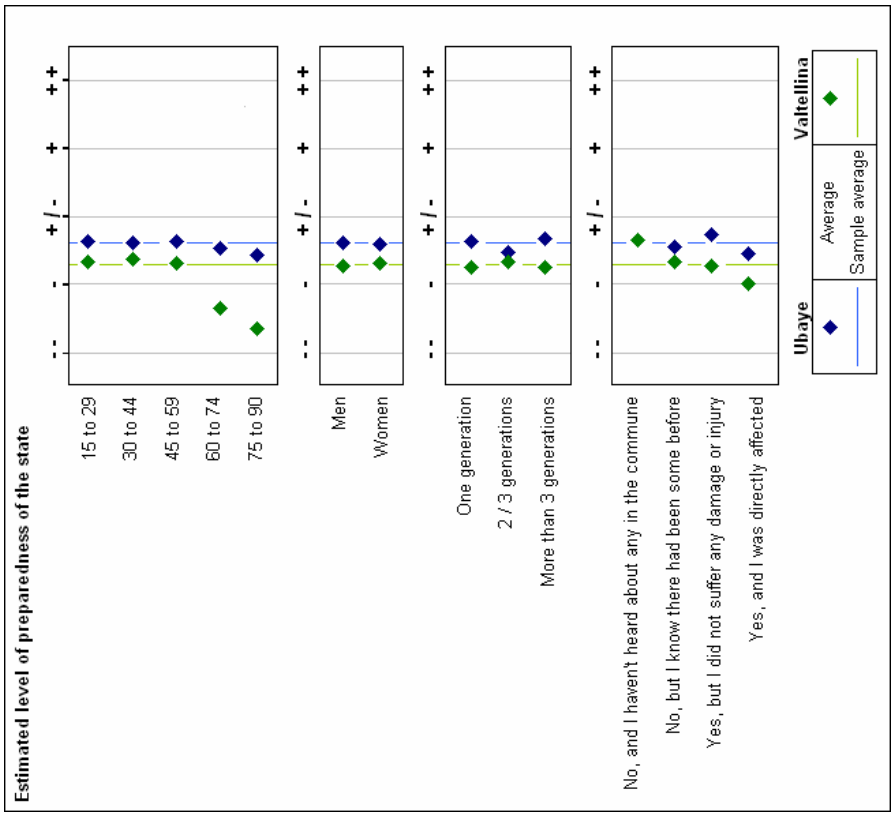


Figure 102. Comparison of average indices by group - estimated preparedness level of national authorities

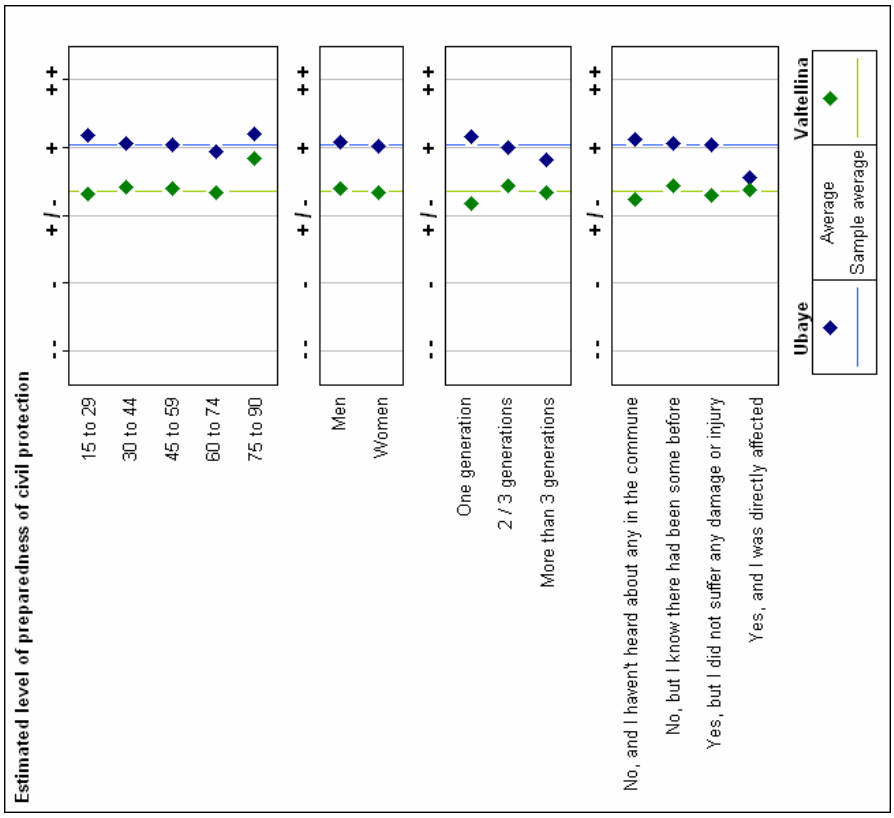


Figure 103. Comparison of average indices by group - estimated preparedness level of civil protection

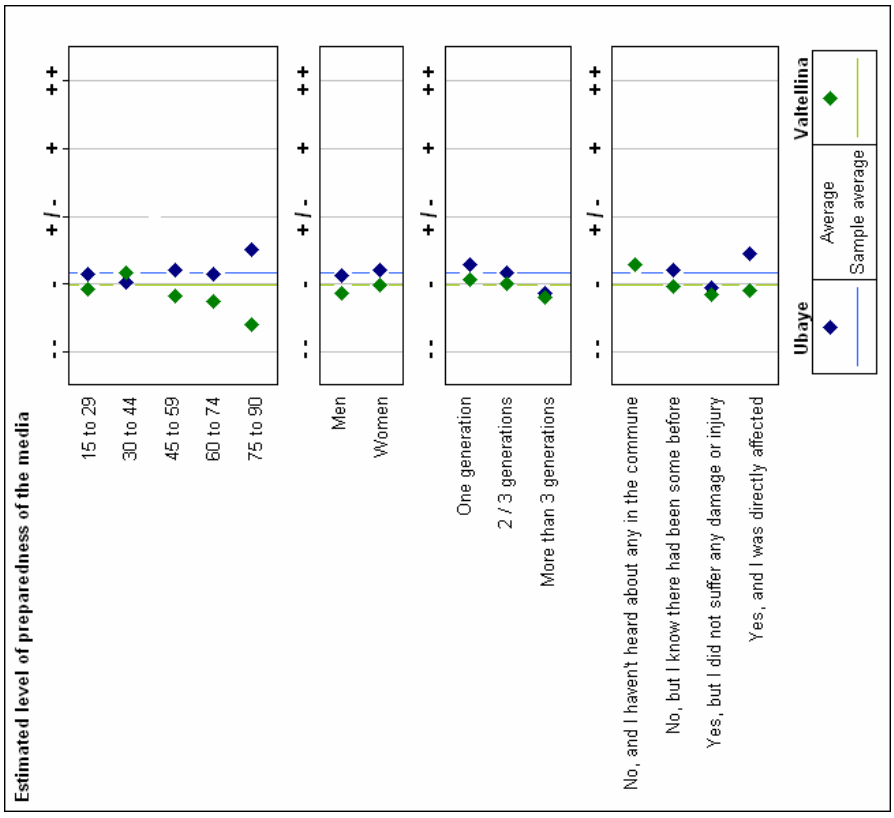


Figure 104. Comparison of average indices by group - estimated preparedness level of mass media

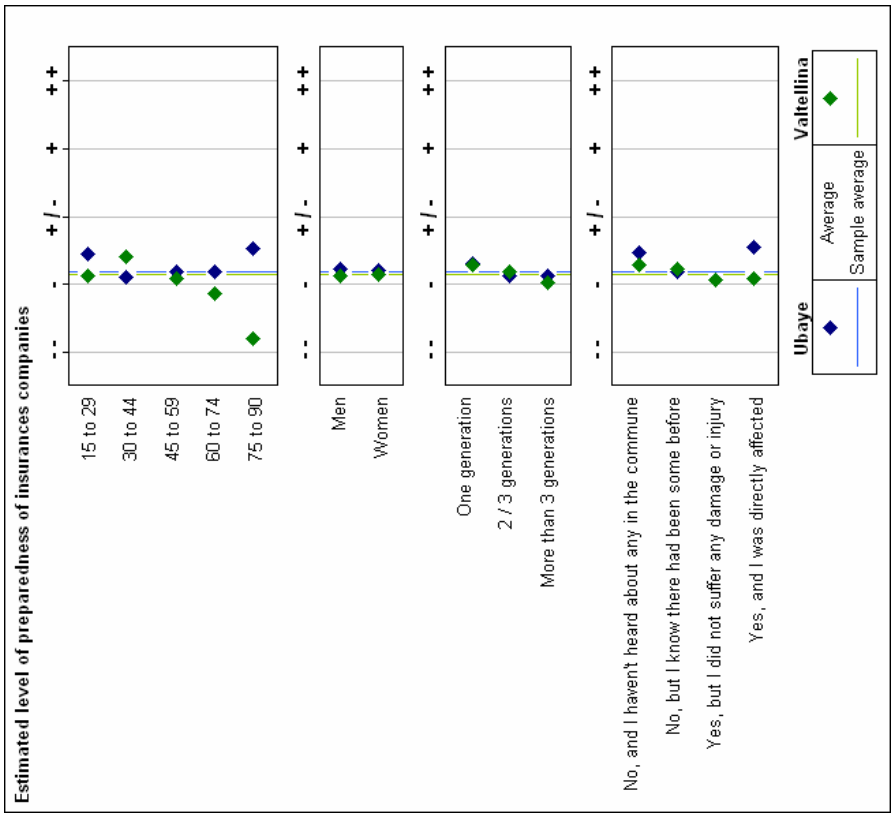


Figure 105. Comparison of average indices by group - estimated preparedness level of insurance companies

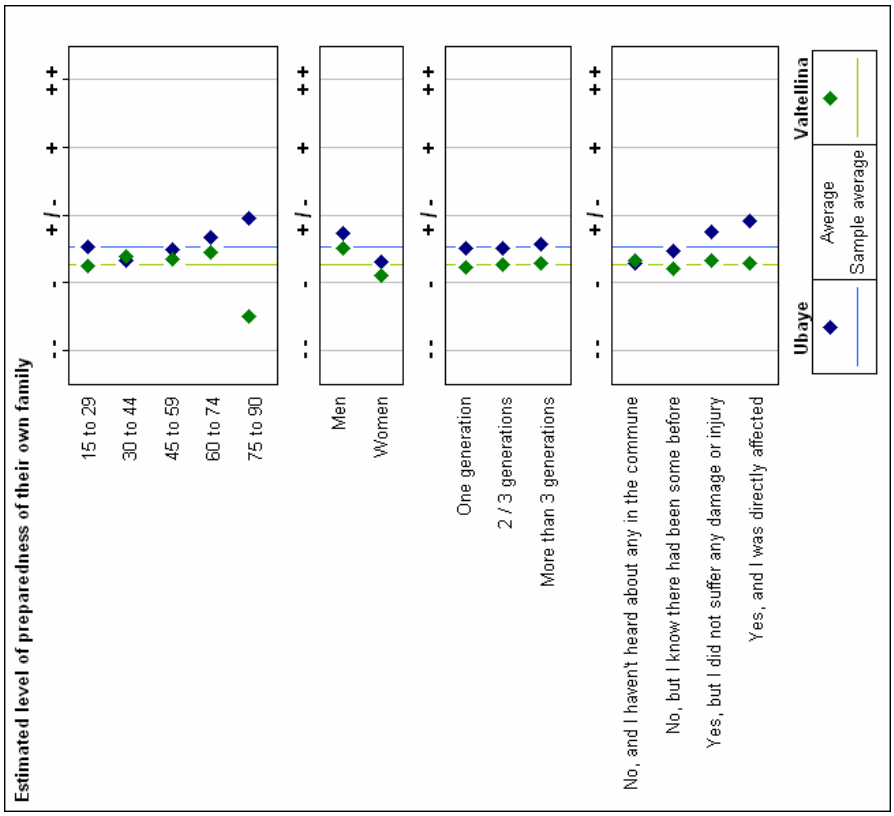


Figure 106. Comparison of average indices by group - estimated preparedness level of respondents' households

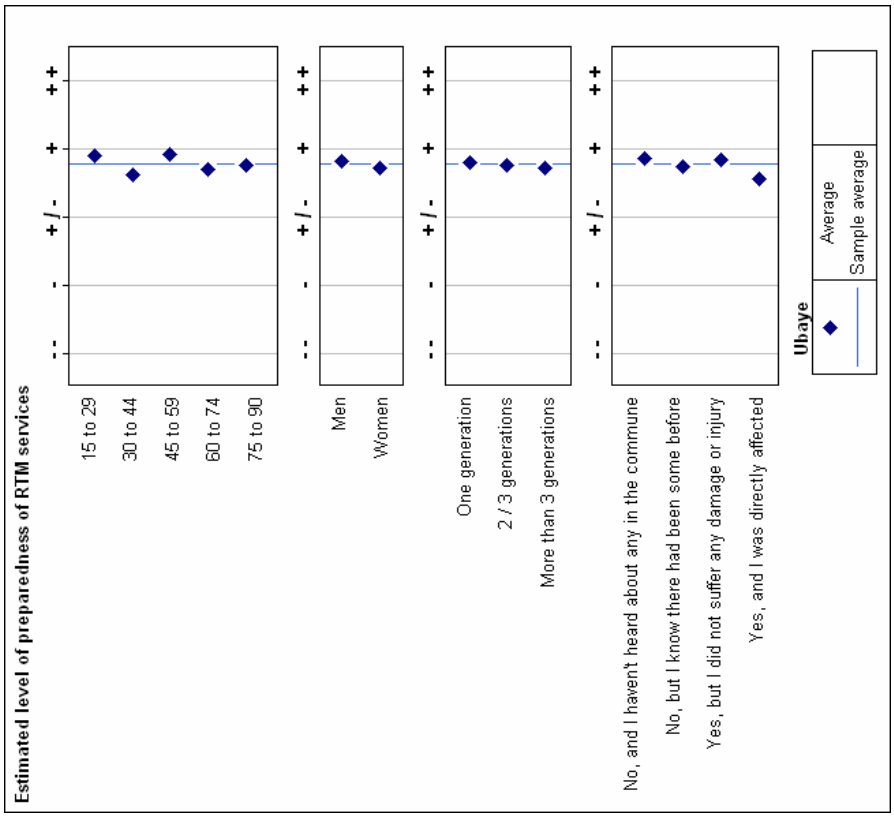


Figure 107. Comparison of average indices by group - estimated preparedness level of forests and mountains services

The distribution of answers to these two questions illustrated a clear link between perceived knowledge and perceived preparedness. There was unfortunately no possibility to analyse further the relationship between these elements: did respondents consider that preparedness relies on knowledge, or did they see a dual link where each element helps reinforcing the other? The relation is not as obvious as it might seem at first.

Final question

Filling the questionnaire required a certain time, during which many risks-related topics were addressed. It was therefore interesting to know how people felt after answering, and compare it with their level of concern when they started the survey.

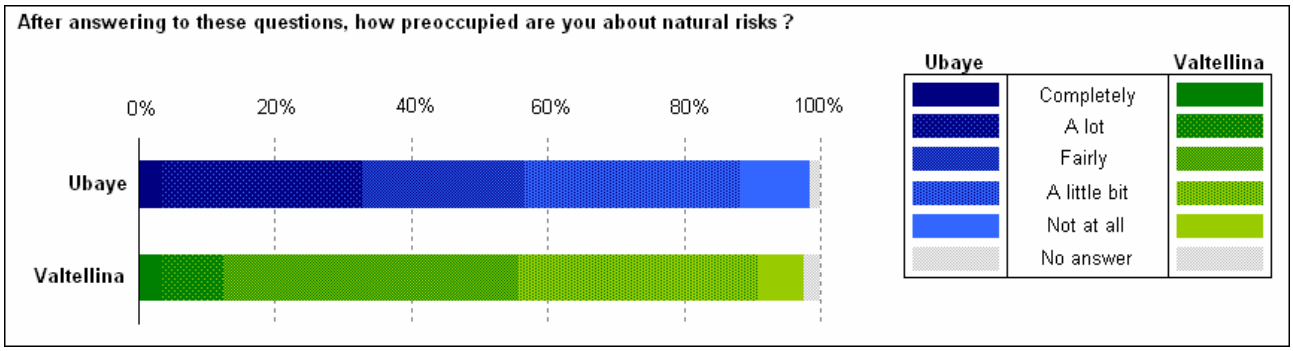


Figure 108. Final level of concern about natural risks

Again, the respondents in Ubaye are more concerned than those in Valtellina.

When comparing with the initial level of concern (see table below), it appears that most respondents showed identical or lower levels of concern after the survey (70% in Ubaye, 85% in Valtellina).

	Ubaye		Valtellina	
Initial level > final level (less concerned after the questionnaire)	128	37%	140	29%
Initial level = final level	114	33%	272	56%
Initial level < final level (more concerned after the questionnaire)	88	26%	55	11%
Incomplete / no answer	14	4%	16	3%
Total	344	100%	483	100%

Figure 109 - Comparison of concern about natural hazards at the start and at the end of the questionnaire

This might be explained by the fact that, after all these questions, they realised they knew more than they expected, or that many actors are involved and strategies are already enforced.

3. 4. 4. Feedback

As planned from the start, the knowledge gathered with this survey was shared with local decision makers, stakeholders and populations.

In Valtellina, the feedback actions were carried by a team of researchers from university of Milano Biccoca. Civil protection as a reference actor was involved in the study all along. Naturally they were interested and very pleased by the results. A public meeting was also organised, and informative talks targeted at pupils in schools.

In Ubaye, a folder summarising the results of the study was edited and distributed to the mayors of investigated towns, representative of the CCVU, local experts of the RTM services, and scientists involved in local studies. In addition, a meeting with all these actors was organised to present the folder, comment the results, and discuss further work.

The first part of the folder was an explanation of the aim of the survey, and the method used. A short summary of the logistics, distribution of the questionnaires and return rate followed. After this, the results were presented in thematic chapters: who answered to the survey, what are people concerned about, what could happen if a landslide or flood event occurred in the area, communication and information about natural hazards and risks, the actors of natural hazards and risks governance. As a conclusion, a short text presented different options of further use of the results.

Moreover, a public meeting was organised in Barcelonnette in June 2010 in the frame of regular “public talks” in summer time.

Entitled “Gravitary hazards and risks in the Barcelonnette basin, synthesis of 15 years of research”, it was divided in three parts. First, Prof. Maquaire (university of Caen, France) and Dr Malet (university of Strasbourg, France) presented the activities of scientists involved in the area. After that, the survey conducted for this work, and its results, were explained to the public. Finally, some time was dedicated to answer questions of the public. Around 50 inhabitants of the area attended this meeting. Their comments and questions were seen as very interesting by the scientists and experts present. Although some of them were clearly only interested in the resolution of a personal conflict, most had come out of interest for the topic in general.

MERCREDI 23 JUIN

BARCELONNETTE

15h00 Dictée à la plume et au stylo. *Médiathèque, salle de recherches.*

20h45 **Causerie** «L'aléa et le risque gravitaire dans le bassin de Barcelonnette, synthèse de 15 années de recherche» par Jean-Philippe Malet de l'université de Strasbourg, chercheur au CNRS, IPG et Olivier Maquaire, professeur des universités. *Salle du marché couvert.*

Figure 110. Anouncement in local newspaper of the public meeting in Barcelonnette, Ubaye

4. Lessons learnt and conclusions

4. 1. Lessons learnt from the case studies

The case studies in Ubaye and Valtellina were rich in lessons. As expected from the start, the comparison of risk perceptions in areas with similar risk settings provided interesting information about elements of risk culture. Although the differences in the adminstrative and legislative systems can partly explain the disimilar strategies chosen to deal with natural risks, risk cultures also play an important role.

The empirical work revealed similiarities and differences between the studied areas. They will be successively presented in the next chapters.

4. 1. 1. Similarities observed between the case study areas

First, the administrative settings in place in Ubaye and Valtellina share a crucial element: the scale at which policies dealing with natural risks are implemented is the municipality. In both cases though, a supra-communal level is involved (CCVU in Ubaye, CMT in Valtellina), as joining the means of several villages gives them more manpower and budget to address the issue more efficiently.

The results of the survey show several similarities between the respondents in Valtellina and in Ubaye.

First, there is a strong difference between men and women perceptions. Women tend to be more concerned and feel less knowledgeable, prepared, and all in all more vulnerable than men

People recognise that natural risks can impact their environment (transport networks, critical lifelines) but consider themselves relatively safe. On every question related to potential damages or consequences of a disaster in their area, respondents considered collective effects as more likely than personal ones. They seem to believe that "it only happens to others".

People ask for more information but do not always want to make efforts to obtain it. In a society where information is available at any time, they still favour information campaigns that come and find them without any action from their side. Perhaps this is due to the vision of information as a one way process, from authorities and experts to “lay people”. When they are offered the possibility to take an active part in discussion, like in public meetings, they show more interest.

An experience of natural disaster obviously influences the perception of natural risks. In both studied areas, compared to others, respondents who stated that they faced a natural disaster before showed more concern about natural risks, rated the consequences on infrastructures and lifelines as more likely, were more likely to look for information actively, demanded more information on the potential physical consequences of a disaster, and felt better informed.

Generally speaking, respondents felt poorly informed about natural hazards and risks.

As observed by several authors, trust in public authorities is low. Nevertheless, it is interesting to note that local authorities were always more valued than national or even regional ones. This is probably linked with the conception that local authorities have a better understanding of local specificities. Municipalities are the first actor requested for information about natural hazards and risks. Following the same idea, the actors seen as more knowledgeable and more prepared were the local authorities, civil protection, and the local technicians and experts.

Respondents seemed critical about the role of media: they asked for a larger coverage of natural risks related topics, but at the same time showed a low level of trust in media.

Last notable similarity, the role of insurance companies in the governance process is seen as rather negative. Their activities in mitigation and the considerable corpus of information they collect on risk and vulnerability are not recognised. Moreover, insurance companies are not trusted, and they are seen as poorly knowledgeable and not prepared.

Some of these elements were already documented (e.g. the gender influence), others might only reveal similarities in risk cultures but not be generalised to the countries studied. It could be of interest to investigate this further in other regions.

4. 1. 2. Dissimilarities observed between the case study areas

Interesting dissimilarities also emerged from the case study analysis.

First, concerning the legal framework enforced, the level at which laws are emited is not the same: in France it is the State, in Italy the regions. This induces differences in the focus and detail of laws. In France, laws related to natural hazards and risks are often hazard independent (they apply to a large category of hazards, such as “gravitary processes” or “floods and inundations”) and not context specific (they apply in all geographic setting, littoral as well as mountains). This creates

inequities, with some areas being held back by decisions ans strategies that hinder their development. In Italy laws are emited by the regions, allowing a better adaptation to local contexts.

The role of insurance is also different. In France insurance against natural disasters is compulsory and managed by the State, when in Italy insurance is optional and compensation is ensured by the State. This implied a difference in the personal involvement of individuals against natural risks. In France the transfer of risk creates a distance between people and natural risks. In Italy the role of individual action is stronger. This was confirmed in the study, as the Valtellina sample showed more interest in individual mitigation measures than the Ubaye sample.

The key local actors were not the same. In Ubaye the RTM services are the local experts on mountains and forests. They inherited the responsibility of technical measures and are a reference when discussing mitigation. In Valtellina, the civil protection, focusing on perparedness and response, is the main interlocutor on the topic of risks. This illustrates the different strategies adopted by France and Italy (as seen in chapter 2.2). Local populations are aware of the importance of these actors, and they were systematically deemed trustworthy, knowledgeable and prepared.

The results of the survey revealed interesting differences.

On all questions, the respondents in Valtellina showed less concern about risk and less interest in informatio than those in Ubaye. Of course this cannot be generalised to their respective regions and countries, but it clearly reveals different risk cultures.

The proportion of respondents who indicated that they had already received information about natural risks was very different, around 1 out of 2 in Ubaye and 1 out of 5 in Valtellina. Moreover, in Ubaye older age groups were more informed than younger ones, and more likely to search actively for information, when in Valtellina the opposite trend was observed. This is important when considering a transfer of methods. For instance, if the communication process of one area was derived from a process applied successfully in another, the differences in the public behaviour could hinder significantly its efficiency.

In addition, the media that effectively spread information on natural risks are not the same in both areas. In Ubaye respondents mentioned reports, in Valtellina it was families and acquaintances. This could mean that reports about different aspects of natural risks are more easily available in Ubaye, or that inhabitants of this area are more likely to search for this type of document. In both case, this would have to be considered in the case of a transfer of methods.

Media solicited for further information were also not the same. When the Ubaye sample ranked the municipalty and official information (such as the commune's newsletter) first, the Valtellina sample asked for a mass media coverage of the question of natural risks. Of course, the type of information expected from these supports are also different.

Moreover, the topics in which people are interested vary slightly. If the first concerns in both sample were evacuation and emergency procedures, respondents in Ubaye ranked the risk zoning as third, whereas in Valtellina it was individual mitigation measures. Considering that risk zoning in France is translated into legally binding land use maps, this can be seen as an opposition of what people have to do and what people can do against natural risks.

The last difference emerging from the result is the expected role of scientists and experts. The Ubaye respondents asked for a larger involvement of these actors in information, but Valtellina respondents did not. This fact is clearly relevant, where scientists and experts benefit of a good image they can help communicating about natural risks, if their image is less good their message will be less accepted.

4. 1. 3. How can the obtained results be further used?

Locally, the results could for instance be used to improve communication by addressing better people's concern and expectations. The differentiated information by groups can help targeting specific campaigns at the right audience. This can help fulfiling the right to information about the environment granted to all citizens by the Aarhus convention. Moreover, similar obligations of information are induced by other texts, such as the Floods directive[182].

The results can also be fed into decision making and risk governance process, as a starting point for involvement of the public. Again, this invovement is required by several texts, for instance the SEA directive[183].

When updating or modifying development and land use plans, the information gathered with these results can help adapt the decision making process, and ultimately decisions, to local perception and cultures. The debate about acceptable level of risks could benefit from such information.

182 European Parliament 2007

183 European Parliament 2001

Actors of risk governance could also use the information gathered on how the respondents perceive them as an audit of their relation to the public, and work on how to improve it.

Scientists can use the methodology to compare perceptions in different risk settings, allowing to investigate the mechanisms of perceptions and cultures. It could be interesting to study the spatial extension and variation of certain elements (e.g. perceived level of information, general concern about natural risks) to try to understand better how they interact to create different risk cultures.

4. 2. Answering to the research questions

The case study work carried for this study was guided by questions stated earlier (see chapter 2.5). As a first conclusion, answers must be given to these questions.

> Do populations trust decision makers?

The distrust was confirmed by the survey results. Respondents showed defiance towards authorities. Nevertheless, it must be noted that this defiance was stronger for national and regional authorities than for local ones. This gradation was applied to trust, perceived level of knowledge and perceived level of preparedness. This calls for a more bottom-up approach in building of regulations and strategies. Moreover, in order to improve the understanding and acceptance of decisions, rebuilding trust should be a priority for authorities

> Are populations interested in participating in decision-making processes?

More than 800 persons took 30 minutes of their time to show that they care about natural risks and the way they are addressed in their communities. This was further confirmed by the attendance to public meetings, and the numerous questions and comments made. The proportion of persons who answered the survey and/or attended the meetings only to raise a personal problem or conflict was rather low. Most respondents were interested in the topic of natural hazards and risks despite having no personal experience with it.

Can the involvement of the public in decision making processes help rebuild trust in authorities?

This cannot be affirmed on the results of the study. Nevertheless, it can be assumed that involving people in the decision making process will make them more likely to understand its outcomes. Although this does not guarantee acceptance, it would certainly help rebuilding trust.

How can the transfer of practices and strategies poses problems?

This issue was faced during the conception of the survey itself. Building a questionnaire intended to be used in different countries raised issues: some questions were problematic for one or the other site, because they refered to topics respondents did not want to discuss with “external” people who did not belong to the community. Some comments received with the filled questionnaires also suggested that it was inappropriate for foreigners to discuss risks and their management in the studied communities. Moreover, the results of the survey indicate major differences between the studied areas, that would lower or even completely cancel the efficiency of a method transferred directly from one area to the other.

Which elements of risk culture should be considered to improve transferability?

As the survey showed important differences in perceptions and cultures, some criteria improving transferability of methods can be identified. First of all, an involvement of stakeholders from both origin and target area is required, to ensure that the processes linked with the method transferred are fully understood. Such processes can encompass various elements, some remaining untold (e.g. relationships between stakeholders, past conflicts, hidden agendas). The participation of several groups of stakeholders to the transfer process, although it does not guarantee its efficiency, allows a more honest and complete representation of the setting. As this survey focused on the public’s perceptions, the identified elements are related with this topic. Based on the results, it seems of particular interest to consider:

- The place of media in communication, and which media are solicited by the public
- The difference in trust accorded to risk governance actors
- The key actors on site, that can differ from the responsible authority
- The general expectation of the public towards authorities (full protection, guidance)

It was also possible to note that some trends were common to both sites (see previous chapter). Other criteria might have to be considered for an efficient transfer of methods depending on the type and focus of the methods transferred. For instance, the economic situation of the area and the activities can play a role (e.g. place of tourism, seasonality of activities).

How can individual risk perceptions be taken into account?

The answer proposed to the previous question proves that, indeed, risk perceptions and risk cultures are important criteria to be considered when transferring methods. As they are complex processes that refer to many elements, some of them being left untold or ignored, apprehending them is difficult. But discarding them will not lower their important role in the risk setting itself. It is crucial to point out the major differences between the source and target area. Generally speaking, it can also be of interest for decision makers and stakeholders involved in risk governance to understand the mechanisms underlying local risk cultures, in order to improve the governance process. The role of individual risk perceptions in the building of risk cultures is important. For instance, individual perceptions can help setting acceptability thresholds. Perceptions can be addressed for instance by a survey such as the one presented in this study.

4. 3. Recommendations

European societies are threatened by natural risks. Although these challenges are already largely addressed at different levels, the risks still exist. There is a need for sharing knowledge and methods. Communities could be inspired by best practice examples. This is clearly acknowledged and recommended by the European Commission, for instance in its communication about natural and man-made risks[184], in which it advises to spread best practices and reinforce international cooperation.

Before considering a tranfer of methods, it is crucial to determine precise objectives: what would be transferred? Where? Who is involved? What are the structuring differences between the sources and the target? What is expected from each party and what do they expect? This concerns not only transfer between authorities, but also transfer via scientists and experts of best practice examples.

184 European Commission 2009

The role of risk perceptions and risk cultures in the risk setting must also be taken into account, as it influences the efficiency of policies and acceptance of decisions. For instance, the level of acceptable risk can largely differ from one area to another. This investigation can be done on the basis of history, past events, legislative framework and administrative setting, previous decisions and policies. A two way communication between decision makers and the public can help gather information, to hear what people have to say. Moreover, such a consultation is nowadays rendered compulsory by several policies related to natural risks, such as the Floods directive. For a deeper insight on the perceptions of risks, and the expectations and comments of the public, a survey can be conducted, supplemented by interviews with local key actors and public meetings.

The existence of local conflicts also has to be investigated. Opposed groups, conflicts on use of space, varying interests are severe obstacles to an inclusive risk governance process. As they remain untold, they can be completely ignored by some partners, who might misunderstand certain decisions.

Including risk perceptions and risk cultures in decision making is complex, bur rewarding. Development and land use plans can benefit from a better understanding of the population's concerns and expectations. It seems fair to hear their voice as they will have to comply to sometimes restrictive decisions. Risk perceptions and risk cultures evolve in time, and this evolution is both influenced by and influencing the efficiency of natural risks governance policies.

On more practical issues and concerns, some hindrances went in the way of this study.

Although crossing borders within Europe is nowadays easy, information and knowledge from other regions and countries are not always welcome. Sometimes local authorities and/or populations might have the impression that foreigners come to teach them good practices, completely ignoring their opinions and concerns. The interest for a two ways relation has to be clearly stated when setting up a transnational collaboration.

An important, and unfortunately unavoidable obstacle to cooperation and sharing is the gap, or more exactly the gaps, between scientific communities, stakeholders groups, decision makers and the population. In addition, the fragmentation of science fields, stakeholders groups and levels of decision makes communication and cooperation even more difficult. All these actors have different agendas, objectives, concerns, and expect others to share them.

4. 4. Final conclusions

Good risk governance requires trust. In the general climate of post-trust societies, it is challenging to rebuild it, but it is rewarding. A large part of risk governance efficiency relies on the compliance to decision, which is undoubtly increased when every relevant actor is involved and gets a chance to understand the mechanisms underlying a decision making process.

This requires two apparently opposed processes. First, authorities have a lot to gain from sharing information and knowledge with other authorities facing similar issues. As the establishment of the frame for these collaborations can be complicated, scientists and experts can provide support. This trend of collaboration and globalisation of information and methods is already acknowledged by institutions such as the European Commission, and its importance is recognised by many experts. Second, it is necessary to take into account local specificities in decision making, also when applying harmonised methods. A raw uniformisation of method does not make sense, it is necessary to adapt best practice examples in order to keep them efficient in different contexts.

A better involvement of all community can help rebuild trust, this can be encouraged by a better understanding of every group's concern. Dialogue is a key element, between groups and within groups. Good governance principles are no miracle solution, but applied to natural risks they can help communities grow more resilient and less vulnerable. This also applies to experts and scientists work, where more multidisciplinarity could be of benefit.

5. References and documents consulted

Aarhus convention, 1998. *Convention on access to information, public participation in decision-making and access to justice in environmental matters*.

AFSSET, 2006. *Perception du risque et participation du public*

Alarslan, E., 2009. *Disaster resilient urban settlements*, Doctoral dissertation, Dortmund

Angignard, M. & Greiving, S., 2010. *Understanding the concerns of people living with the risk: example in the Ubaye Valley, France*, in Malet, J.-P., Glade, T., Casagli, N. ed., *Mountain Risks: bringing science to society*, Strasbourg CERG editions

Audrechy, D., 2001. *Vivre en montagne avec les risques naturels*, Paris: Ministère de l'Aménagement du Territoire et de l'Environnement.

Beck, U., 2008. *La société du risque: sur la voie d'une autre modernité*, Paris: Flammarion.

Béguin, M. & Pumain, D., 2007. *La représentation des données géographiques : statistique et cartographie* 2e éd., Paris: Colin.

Bell, R., Glade, T. & Danscheid, M., 2005. *Challenges in defining acceptable risk levels. Dans Coping with risks due to natural hazards in the 21st century « RISK 21 ».* Ammann W. & Dannemann S., p. 1-10.

Berke, P., Smith, G., 2009. *Hazard mitigation, planning and disaster resiliency: challenges and strategic choices for the 21st century*. In Fra Paleo, U. ed., *Building safer communities. Risk governance, spatial planning and responses to natural hazards* , IOS Press., Amsterdam, Washington DC, p. 1-20.

Birkmann, J. et al., 2008. *Extreme events and disasters: a window of opportunity for change? Analysis of organizational, institutional and political changes, formal and informal responses after mega-disasters*. Natural Hazards, 55(3), p.637-655.

Birkmann, J., 2006a. *Measuring vulnerability to promote disaster-resilient societies: conceptual frameworks and definitions*. In Birkmann, J., ed *Measuring vulnerability to natural hazards: towards disaster resilient societies*. p. 9-54.

Birkmann, J., ed., 2006b. *Measuring vulnerability to natural hazards: towards disaster resilient societies*, Tokyo;New York: United Nations University.

Böhme, K. & ESPON., 2006. *Territory matters for competitiveness and cohesion: facets of regional diversity and potentials in Europe*, [Esch-sur-Alzette]: ESPON.

Boudières, V., 2006. *The notion of risk governance: an application in terms of the vulnerability of mountain tourism areas*. Revue de géographie alpine, 94(1), p.64-74.

Burby, R., 1998. *Cooperating with nature: confronting natural hazards with land use planning for sustainable communities*, Washington D.C.: Joseph Henry Press.

CETE Méditerranée, 1987. *Plan d'exposition aux risques naturels - Commune de Barcelonnette - II aléas : mouvement de terrains & sismique*

Chauvin, B., Hermand, D. 2002. *From disaster risk assessment to risk management in megacities*, Proceedings of the second annual IIASA-DPRI meeting, Laxenburg, in Thywissen, K., 2006b, *Core terminology of disaster reduction: a comparative glossary*

Cividin, A., 2007. *Cross-cultural communication policy and the implications for spatial planning: towards planning for intercultural areas*. Paper presented for the AESOP General Assembly 2007. Napoli.

Coste, J., 1995. *Vallis Montium : histoire de la vallée de Barcelonnette, hautes terres de Provence, des origines à nos jours* . Reprinting of the original edition Barcelonette: Sabença de la valeia.

Covello, V., 1992. *Risk comparisons and risk communication*, in Kasperson, R., Stallen, P., *Communicating risk to the public*, Amsterdam: Kluwer, quoted in Dauphiné, A., *Risques et catastrophes : observer, spatialiser, comprendre, gérer.*, Paris: A. Colin

Dagorne, A., 2001. *Les risques naturels : la cindynique* 2nd ed., Paris: PUF.

Dammers, E., Evers, D. & de Vries, A., 2007. *The future of Europe as a risk society*. Paper presented for the AESOP General Assembly 2007. Napoli.

DATAR, 2004. *Territoires 2020*.

Dauphiné, A., 2003. *Risques et catastrophes : observer, spatialiser, comprendre, gérer*., Paris: A. Colin.

Debarbieux, B. et al., 2006. *Governance capacity - What is it - other than economic and ecological aspects - that prompts people to stay in th Alps or to move to the Alps? How can we consolidate the governance capacity of individuals and communities?*

Deshaies, M., 2003. *Les Alpes, un espace à risques ?*, in Moriniaux, V., *Les risques*, Nantes: Éditions du Temps, p. 205-221

Douard, P., 2004. *La politique de prévention des risques en France*, in Veyret, Y., Garry, G. & Meschinet de Richemond, N. ed., *Risques naturels et aménagement en Europe*, Paris: A. Colin., p.14-17.

Etkin, D., 2009. *Patterns of risk : spatial planning as a strategy for the mitigation of risk from natural hazards*, In Fra Paleo, U. ed., *Building safer communities. Risk governance, spatial planning and responses to natural hazards* , IOS Press., Amsterdam, Washington DC, p. 44-60.

European Commission., 1999. *ESDP, European spatial development perspective: towards balanced and sustainable development of the territory of the European Union*.

European Commission, 2001. *European governance - A white paper*.

European Commission, 2009*, A community approach on the prevention of natural and man-made disasters*.

European Parliament, 2001, *Directive 2001/42/EC of the European Parliament and of the Council on the assessment of the effects of certain plans and programmes on the environment*

European Parliament, 2007, *Directive 2007/60/EC of the European Parliament and of the Council on the assessment and management of flood risks*.

Fleischhauer, M., 2004. *Klimawandel, Naturgefahren und Raumplanung*, Dortmund: Dortmunder Vertrieb für Bau- und Planungsliteratur, quoted in Greiving, S., 2006. *Integrated risk assessment of multi hazards: a new methodology,* p. 77.

Fleischhauer, M., 2006a. *Natural hazards and spatial planning in Europe: an introduction*, in Fleischhauer, M., Greiving, S., Wanczura, S., *Natural hazards and spatial planning in Europe*, Dortmund: Dortmunder Vertrieb für Bau- und Planungsliteratur, p. 9-18.

Fleischhauer, M., 2006b. *Spatial relevance of natural and technological hazards*, in Schmidt-Thomé, P., ed., *The spatial effects and management of natural and technological hazards in Europe* - ESPON 1.3.1., p. 7-16.

Fleischhauer, M., Greiving, S., Wanczura, S., 2006. *Natural hazards and spatial planning in Europe*, Dortmund: Dortmunder Vertrieb für Bau- und Planungsliteratur.

Forester, J., Theckethil R. K., 2009. *Rethinking risk management policies: from "participation" to processes of dialogue, debate and negotiation*, In Fra Paleo, U. ed., *Building safer communities. Risk governance, spatial planning and responses to natural hazards* , IOS Press., Amsterdam, Washington DC, p.34-43.

Fra Paleo, U. ed., 2009. *Building safer communities. Risk governance, spatial planning and responses to natural hazards* , IOS Press., Amsterdam, Washington DC.

Galderisi, A., Ferrara, F. & Ceudech, A., 2010. *Resilience and/or vulnerability? Relationships and roles in risk mitigation strategies*. Paper presented for the AESOP General Assembly 2010. Helsinki.

Glatron, S., 2003. *Culture des risques*, in Moriniaux, V., *Les risques*, Nantes: Éditions du Temps, p. 71-87.

Godschalk, D., 1999. *Natural hazard mitigation: recasting disaster policy and planning*, Washington D.C.: Island Press.

Gregory, G., Loveridge, A. & Gough, J., 1997. *Social and cultural aspects of natural hazards perception and response*. New Zealand Geographer, p.47-54.

Greiving, S., 2006a. *Integrated risk assessment of multi hazards: a new methodology*, in Schmidt-Thomé, P., ed, *The spatial effects and management of natural and technological hazards in Europe* - ESPON 1.3.1., p.75-82.

Greiving, S., 2006b. What are the real needs of spatial planning for dealing with natural hazards?, in Fleischhauer, M., Greiving, S., Wanczura, S., *Natural hazards and spatial planning in Europe*, Dortmund: Dortmunder Vertrieb für Bau- und Planungsliteratur, p. 185-202.

Greiving, S., Fleischhauer, M., 2006. *Spatial planning reponse to natural and technological hazards*, in Schmidt-Thomé, P., ed, *The spatial effects and management of natural and technological hazards in Europe* - ESPON 1.3.1., p.109-124.

Greiving, S., Fleischhauer, M. & Lückenkötter, J., 2006. *A Methodology for an integrated risk assessment of spatially relevant hazards*. Journal of Environmental Planning and Management, 49(1), p.1-19

Gunne-Jones, A., 2003. *Land-use planning: how effective is it in reducing vulnerability to natural hazards?*

Haque, C.E. et al., 2006. *The need for an integrative scientific and societal approach to natural hazards*. Natural hazards, p.155-157.

Hay, C. & WBGU (Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen) (Germany), 2000. *World in transition: strategies for managing global environmental risks: annual report 1998*, Berlin, New York: Springer.

Ho, M.-C. et al., 2008. *How Do Disaster Characteristics Influence Risk Perception?* Risk Analysis, 28(3), p.635-643.

Hugonie, G., 2004. *Les espaces des risques dans les pays méditerranéens* in Wackermann, G. éd., *La géographie des risques dans le monde*, Paris: Ellipses, p. 259-286.

Imirland consortium, 2004. *Management guidelines for the relationships among decision-makers, scientists and the people exposed to risk*.

INSEE (Institut National de la Statistique et des Études Économiques), 1999. *Census*. Available in French on their website : www.recensement-1999.insee.fr

IRGC, 2005. *Risk governance - Towards an integrative approach*.

IRGC, 2008. *An introduction to the IRGC Risk Governance Framework.*

IRSN, 2006. *Experts et grand public : quelles perceptions face au risque* ?

ISTAT (Istituto Nazionale di Statistica), 2001. *Census*. Available in English on their website : http://sitis.istat.it/sitis/html/indexEng.htm

Janin Rivolin, U., 2008. *Conforming and Performing Planning Systems in Europe: An Unbearable Cohabitation*. Planning Practice and Research, 23(2), p.167-186.

Jimenez, M. J., Giardini, D., Grünthal, G., 2003. *The ESC-SESAME unified hazard model for euromediterranean region*, EMSC/CSEM Newsletter 19 p.2-4.

Lavis, J.N. et al., 2003. *How can research organisations more effectively transfer research knowledge to decision makers?* The Milbank Quarterly, p.221-248.

Löfstedt, R., 2009. *Risk management in post-trust societies*, London: Earthscan.

Malet, J.-P., Glade, T. & Casagli, N. ed., 2010. *Mountain Risks: bringing science to society*, Strasbourg: CERG Editions.

Malet, J.-P., Remaître, A. & Bogaard, T. ed., 2009. *Landslide processes: from geomorphologic mapping to dynamic modelling*, Strasbourg: CERG Editions.

McInnes, R., Isle of Wight Centre for the Coastal Environment. & Jakeways, J. ed., 2002. *Instability: planning and management: seeking sustainable solutions to ground movement problems*, London: Thomas Telford.

McInnes, R. et al. éd., 2007. *Landslides and climate change - Challenges and solutions*, Leiden: Taylor & Francis.

Miles, B. & Morse, S., 2007. *The role of news media in natural disaster risk and recovery*. Ecological economics, p.365-373.

Ministère de l'écologie et du développement durable, *Plans de prévention des risques naturels (PPR) - Guide de la concertation*.

Ministère de l'équipement, des transports et du logement & Ministère de l'aménagement du territoire et de l'environnement, 1999. *Plans de prévention des risques naturels, PPR, risques de mouvements de terrain : guide méthodologique*, Paris: la Documentation française.

Ministère de la Santé, de la Jeunesse, des Sports et de la vie associative, Ministère de l'Écologie, de l'Énergie, du Développement Durable et de l'Aménagement du Territoire, 2008. *Les effets qualitatifs du changement climatique sur la santé en France*.

Moneo, M., Iglesias, A., 2004. *Types of drought*, in Environmental sciences published for everybody round the Earth, educational netwrok on climate, quoted in in Schmidt-Thomé, P., ed, *The spatial effects and management of natural and technological hazards in Europe* - ESPON 1.3.1., p.21

Moriniaux, V., 2003. *Les risques*, Nantes: Éditions du Temps.
Nadin, V. & Stead, D., 2007. *European models of society, planning systems and planning cultures*. Paper presented for the AESOP General Assmebly 2007. Napoli.

National Research Council (U.S.)., 1991. *A Safer future: reducing the impacts of natural disasters*, Washington D.C.: National Academy Press.

National Research Council (U.S.)., 2006. *Facing hazards and disasters: understanding human dimensions*, Washington D.C.: National Academies Press.

Newman, P. & Thornley, A., 1996. *Urban planning in Europe: international competition, national systems, and planning projects*, London, New York: Routledge.

NOAA Coastal services center, 2007. *Introduction to stakeholder participation*.

Olshansky, R.B., 2009. *The challenges of planning for post-disaster recovery*, In Fra Paleo, U. ed., *Building safer communities. Risk governance, spatial planning and responses to natural hazards* , IOS Press., Amsterdam, Washington DC, p.175-181.

Oxford Dictionary, 2005.

Pearce, L., 2005. *The value of public participation during a hazard, impact, risk and vulnerability analysis*. Mitigation and Adaptation Strategies for Global Changes, p.411-441.

Pelling, M., 2003. *The vulnerability of cities. Natural disaster and social resilience*, Oxford : Earthscan, quoted in Vinet, F., *Approche institutionnelle et contraintes locales de la gestion du risque. Recherches sur le risque inondation en Languedoc-Roussillon*, Habilitation dissertation, Université Paul Valéry Montpellier III

Peltier, A., 2005. *La gestion des risques naturels dans les montagnes d'Europe occidentale*, Doctoral dissertation, Université de Toulouse II Le Mirail

Penverne, F., 2008. *L'Union européenne et la protection civile*, Rennes: Éd. Apogée.

Peters, R.G., Covello, V.T. & McCallum, D.B., 1997. *The determinants of trust and credibility in environmental risk communication: an empirical study*. Risk analysis, p.43-54.

Plattner, T., Plapp, T. & Hebel, B., 2006. *Integrating public risk perception into formal natural hazard risk assessment.* NHESS, p.471-483.

Pottier, N., Veyret, Y., Meschinet de Richemond, N., Hubert, G., Reliant, C., Dubois-Maury, J., 2004. *Évaluation de la politique publique de prévention des risques naturels*, in Veyret, Y., Garry, G. & Meschinet de Richemond, N. ed., *Risques naturels et aménagement en Europe*, Paris: A. Colin., p. 46-67.

Rashed, T., Weeks, J., 2003. *Assessing vulnerability to earthquake hazard through spatial multicriteria analysis of urban areas*, in International geographical information science 2003 vol 17 No 26, p. 547-576, quoted in Thywissen, K., *Components of risk : a comparative glossary*, Bonn: UNU-EHS

Renn, O., 1992. *Concepts of risk: a classification*, in Krimsky, S., Golding, D., ed, *Social theories of risk*, Wesport, CT, London: Praeger, p. 57-75., quoted in Hay, C. & WBGU (Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen) (Germany), *World in transition: strategies for managing global environmental risks: annual report 1998*, Berlin, New York: Springer

Rougier, H., 2004. *Dangers et risques naturels en montagne*, in Wackermann, G. éd., *La géographie des risques dans le monde*, Paris: Ellipses, p. 161-192

Rynes, S.L., Bartunek, J.M. & Daft, R.L., 2011. *Across the great divide: knowledge creation and transfer between practitioners and academics*. Academy of Management Journal, p.340-355.

Schmidt-Thomé, P., ed.,2006. *The spatial effects and management of natural and technological hazards in Europe* - ESPON 1.3.1.

Schmidt-Thomé, P., Kallio, H., 2006, *Natural and technological hazard maps of Europe*, in Schmidt-Thomé, P., ed, *The spatial effects and management of natural and technological hazards in Europe* - ESPON 1.3.1., p. 17-64.

Stirling, A. & European Commission., 2006. *Gover'Science Seminar 2005 - Outcomes: from science and society to science in society: towards a framework for « co-operative research »,* Luxembourg: Office for Official Publications of the European Communities.

Territorial agenda of the European Union, 2007

Thouret J.-C., Leone, F., 2003. *Aléas, vulnérablités et gestion des risques naturels* in Moriniaux, V., *Les risques*, Nantes: Éditions du Temps. P. 37-70.

Thywissen, K., 2006a. *Core terminology of disaster reduction: a comparative glossary*, in Birkmann, J., ed., *Measuring vulnerability to natural hazards: towards disaster resilient societies*, Tokyo;New York: United Nations University.

Thywissen, K., 2006b. *Components of risk : a comparative glossary*, Bonn: UNU-EHS.

Tierney, K. J., Lindell, M. K., Perry, R. W., ed, 2001. *Facing the unexpected, disaster preparedness and reponse in the United States*, New York: Joseph Henry Press

Toutain, C., 2001. *Prévenir les catastrophes naturelles*, Toulouse: Milan.

TUSTNET, 1999. *The TRUSTNET framework - A new perspective on ris governance*,

UN/ISDR, 2004. *Living with risk: a global review of disaster reduction initiatives*

Valleron, A.-J., Boumendil, A., 2004. *Épidémiologie et canicules : analyses de la vague de chaleur 2003 en France*, C.R. Biologies 327 (2004) p. 1125-1141.

Veyret, Y., 2001. *Géographie des risques naturels*, Paris: la Documentation française.

Veyret, Y., 2003. *Les risques*, Paris: Sedes.

Veyret, Y., Garry, G. & Meschinet de Richemond, N. ed., 2004. *Risques naturels et aménagement en Europe*, Paris: A. Colin.

Veyret, Y., Meschinet de Richemond, N., 2003. *Les risques naturels en Europe : la diversité des réponses* in Veyret, Y., 2003 *Les risques*, Paris : Sedes. P. 147-160

Vigneron, E., 1997. *Géographie et statistique*, Paris: Presses universitaires de France.

Villagrán de León, J. & United Nations University., 2006. *Vulnerability: a conceptual and methodological review*, Bonn Germany: UNU-EHS.

Vinet, F., 2007. *Approche institutionnelle et contraintes locales de la gestion du risque. Recherches sur le risque inondation en Languedoc-Roussillon.* Habilitation dissertation. Université Paul Valéry, Montpellier III.

de Vries, J.R., 2009. *Trust as a central concept in planning research and practice*. Paper presented for AESOP General Assembly 2009. Liverpool.

Wackermann, G. éd., 2004. *La géographie des risques dans le monde*, Paris: Ellipses.

Weber, M., 1962. Basic concepts is sociology, New York: Philosophical library,quoted in Löfstedt, R., *Risk management in post-trust societies*, London: Earthscan

Wiedemann, P. M., Rohrmann, B., Jungermann, H., 1991. *Das Forschungsgebiet „Risiko-Kommunikation“*, in Jungermann, H., Rohrmann, B., Wiedemann, P. M. ed, Risikokontroversen – Konzepte, Konflikte, Kommunikation, Berlib, Heidelberg, New York: Springer, quoted in Hay, C. & WBGU (Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen) (Germany), *World in transition: strategies for managing global environmental risks: annual report 1998*, Berlin, New York: Springer

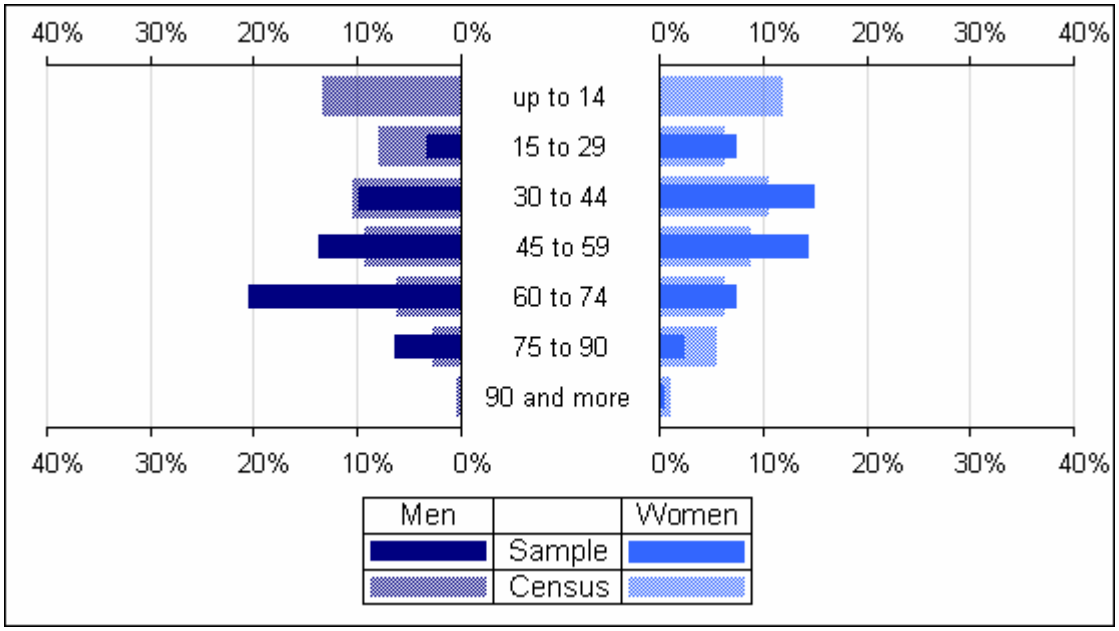
White, G.F., Kates, R.W. & Burton, I., 2001: *Knowing better and losing even more: the use of knwoledge in hazards management. Environmental hazards*, p.81-92.

6. Annexes: results of the survey

Question: Age and gender

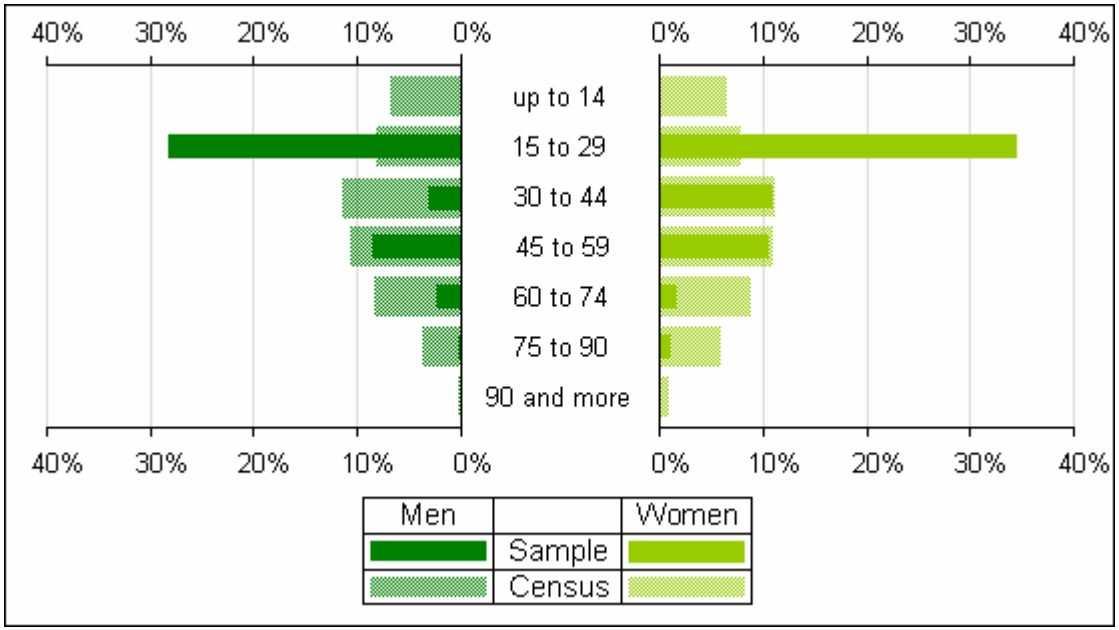
Ubaye

		Sample						Census					
		Men		Women		All		Men		Women		All	
Age group	Up to 14	-	-	-	-	-	-	692	13,3%	609	11,7%	1301	25,0%
	15 to 29	11	3,2%	25	7,3%	36	10,5%	414	7,9%	333	6,4%	747	14,3%
	30 to 44	34	9,9%	51	14,9%	85	24,8%	545	10,5%	538	10,3%	1083	20,8%
	45 to 59	47	13,7%	49	14,3%	96	28,0%	484	9,3%	454	8,7%	938	18,0%
	60 to 74	70	20,4%	25	7,3%	95	27,7%	323	6,2%	322	6,2%	645	12,4%
	75 to 90	22	6,4%	8	2,3%	30	8,7%	146	2,8%	281	5,4%	427	8,2%
	90 and +	0	0%	1	0,3%	1	0,3%	17	0,3%	53	1,0%	70	1,3%
	Total	184	53,6%	159	46,4%	343	100%	2621	50,3%	2590	49,7%	5211	100%



Valtellina

		Sample						Census					
		Men		Women		All		Men		Women		All	
Age group	Up to 14	-	-	-	-	-	-	1977	6,8%	1876	6,4%	3853	13,2%
	15 to 29	136	28,2%	165	34,2%	301	62,3%	2373	8,1%	2266	7,8%	4639	15,9%
	30 to 44	15	3,1%	52	10,8%	67	13,9%	3313	11,4%	3180	10,9%	6493	22,3%
	45 to 59	41	8,5%	50	10,4%	91	18,8%	3086	10,6%	3155	10,8%	6241	21,4%
	60 to 74	11	2,3%	7	1,4%	18	3,7%	2396	8,2%	2507	8,6%	4903	16,8%
	75 to 90	1	0,2%	5	1,0%	6	1,2%	1069	3,7%	1679	5,8%	2748	9,4%
	90 and +	0	0%	0	0%	0	0%	43	0,1%	206	0,7%	249	0,9%
	Total	204	42,2%	279	57,8%	483	100%	14257	48,9%	14869	51,1%	29126	100%

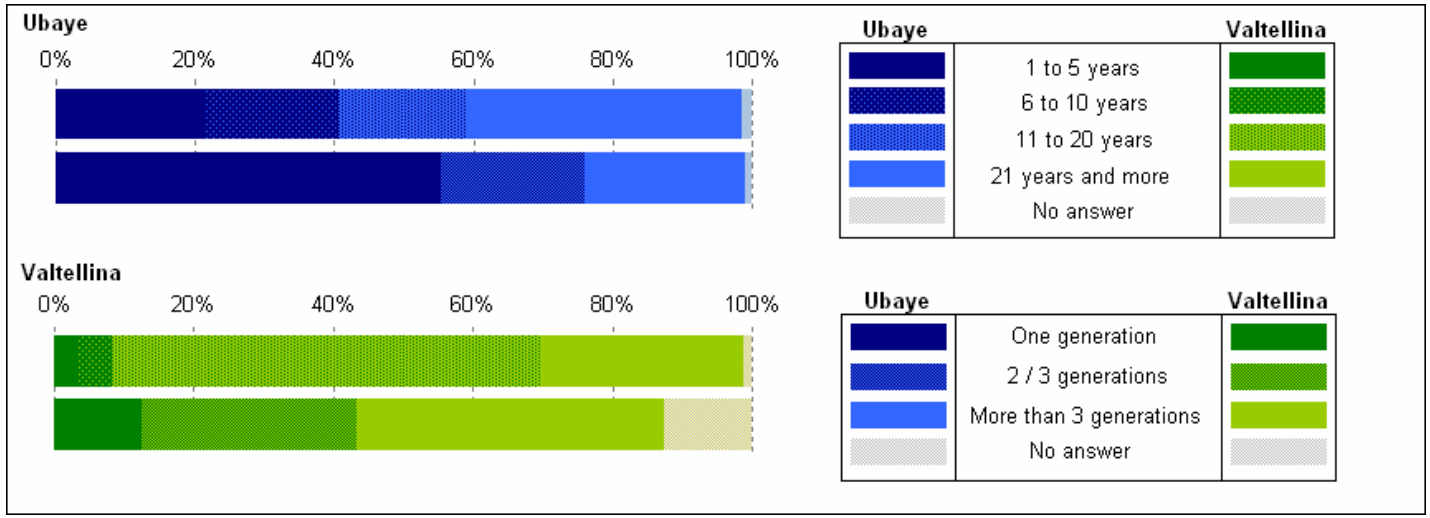


Question: How long have you been living in the valley?

Ancientness	Ubaye		Valtellina	
1 to 5 years	74	21,5%	16	3,3%
6 to 10 years	66	19,2%	24	5,0%
11 to 20 years	63	18,3%	297	61,5%
21 years and more	136	39,5%	140	29,0%
No answer	5	1,5%	6	1,2%
Total	344	100%	483	100%

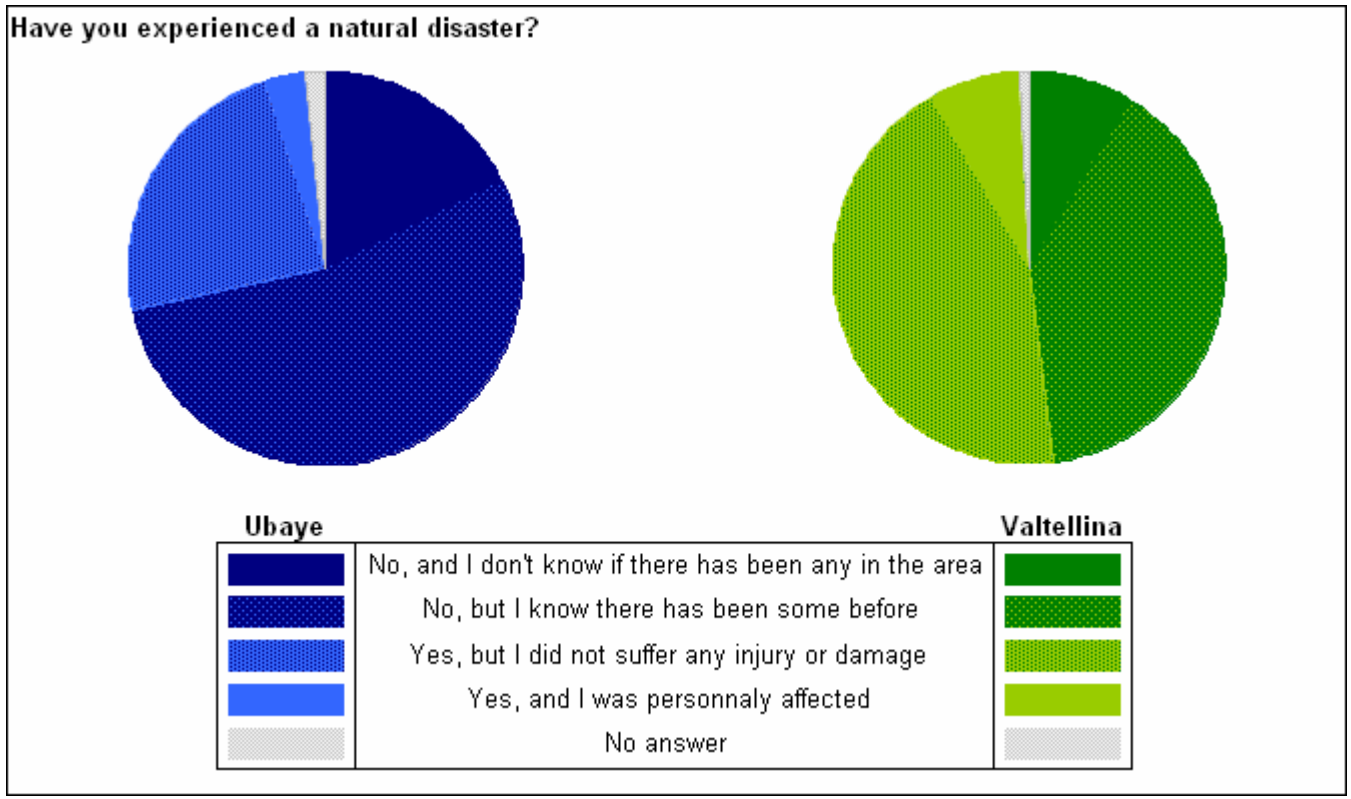
Question: How many generations of your family have lived in the valley?

Ancientness	Ubaye		Valtellina	
One generation	191	55,5%	62	12,8%
Two or three generations	71	20,6%	148	30,6%
More than three generations	79	23,0%	212	44,0%
No answer	3	0,9%	61	12,6%
Total	344	100%	483	100%



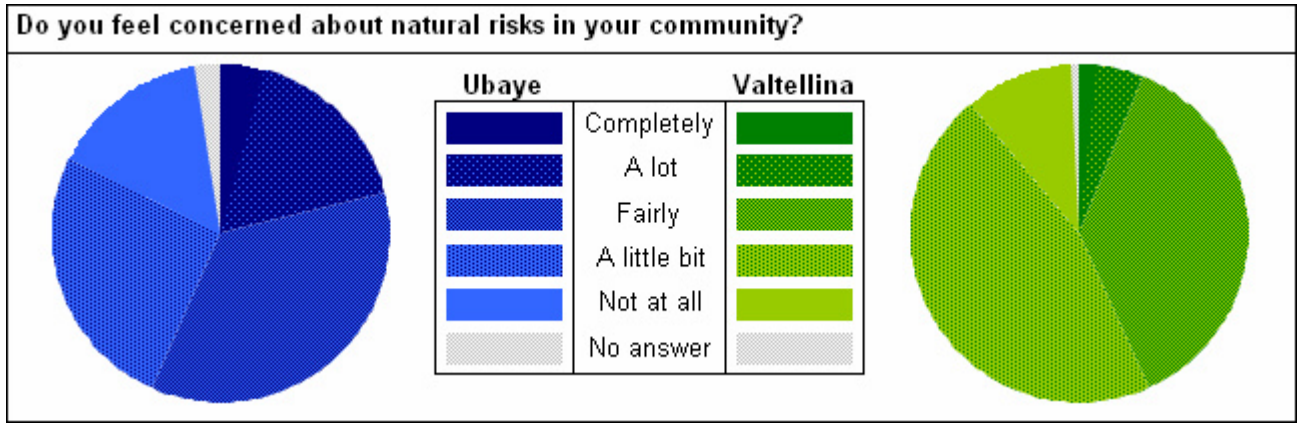
Question: Have you already experienced a natural disaster?

Experience with natural disaster	Ubaye		Valtellina	
No, and I haven't heard about any in the valley	60	17%	42	9%
No, but I know there had been some before	187	54%	190	39%
Yes, but I didn't suffer any damage or injury	80	23%	211	44%
Yes, and I was directly affected	11	3%	36	7%
No answer	6	2%	4	1%
Total	344	100%	483	100%



Question: Do you feel concerned about natural hazards in your community?

Concern about natural risks			Ubaye		Valtellina	
	++	Completely	14	4%	8	2%
	+	A lot	59	17%	22	5%
	+/-	Fairly	122	35%	179	37%
	-	A little bit	88	26%	220	46%
	--	Not at all	52	15%	50	10%
	#	No answer	9	3%	4	1%
		Total	344	100%	483	100%



Crossing this question with age by the use of indices

		Concern about natural hazards	
		Ubaye	Valtellina
Age group	Sample	2,69	2,41
	15 to 29	2,92	2,38
	30 to 44	2,52	2,33
	45 to 59	2,69	2,49
	60 to 74	2,71	2,65
	75 to 89	2,78	3,00
	90 and +	3,50	-

Crossing this question with gender by the use of indices

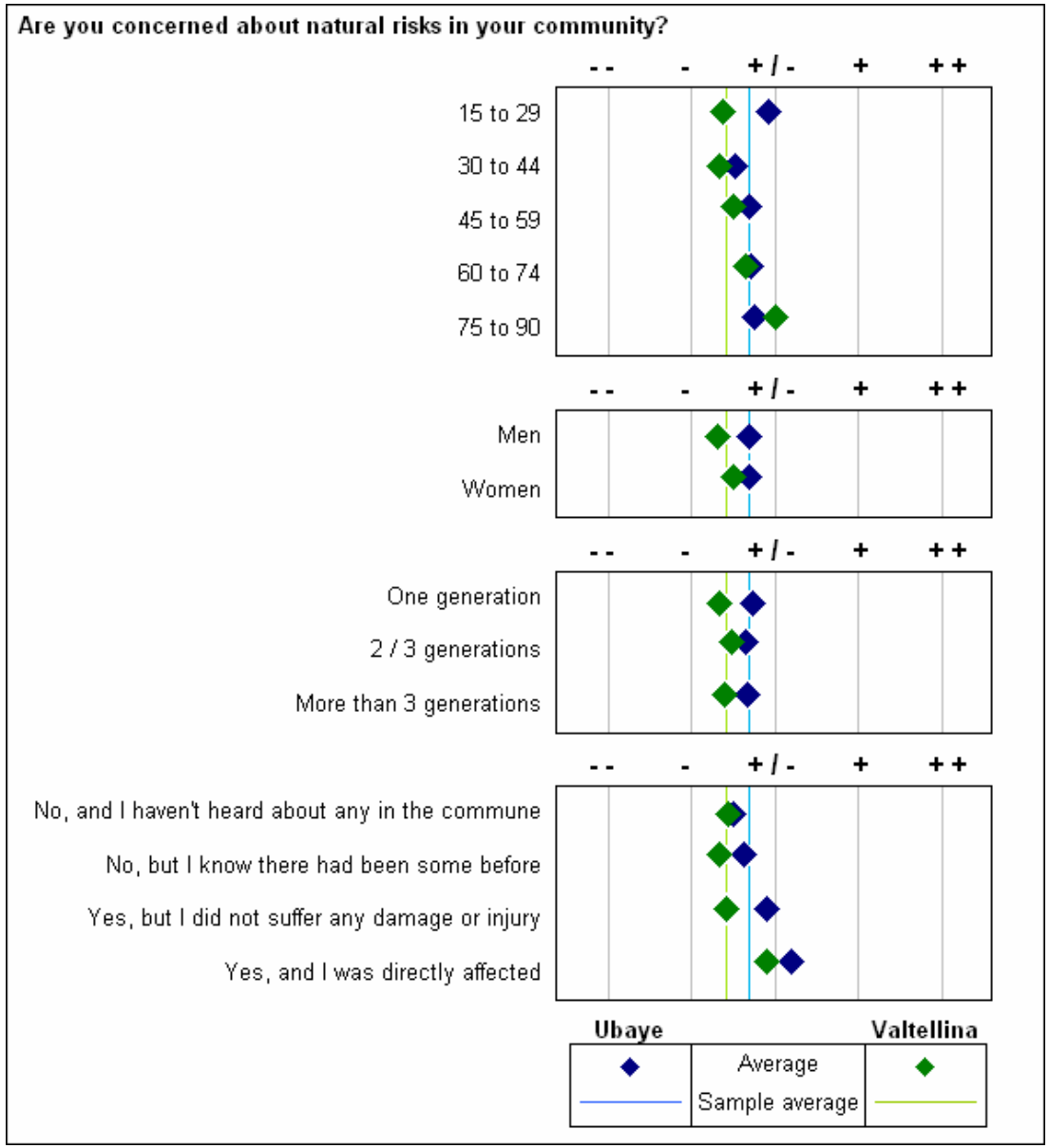
		Concern about natural hazards	
		Ubaye	Valtellina
Gender	Sample	2,69	2,41
	Men	2,69	2,30
	Women	2,68	2,49

Crossing this question with ancientness in the valley (in generations) by the use of indices

		Concern about natural hazards	
		Ubaye	Valtellina
Ancientness (generations)	Sample	2,69	2,41
	One	2,72	2,33
	Two or three	2,63	2,48
	More than three	2,66	2,40

Crossing this question with former experience with natural disasters by the use of indices

		Concern about natural hazards	
		Ubaye	**Valtellina**
Experience with disaster	**Sample**	2,69	2,41
	No, and I haven't heard about any in the commune	2,50	2,44
	No, but I know there had been some before	2,63	2,32
	Yes, but I didn't suffer any damage or injury	2,90	2,41
	Yes, and I was directly affected	3,18	2,89

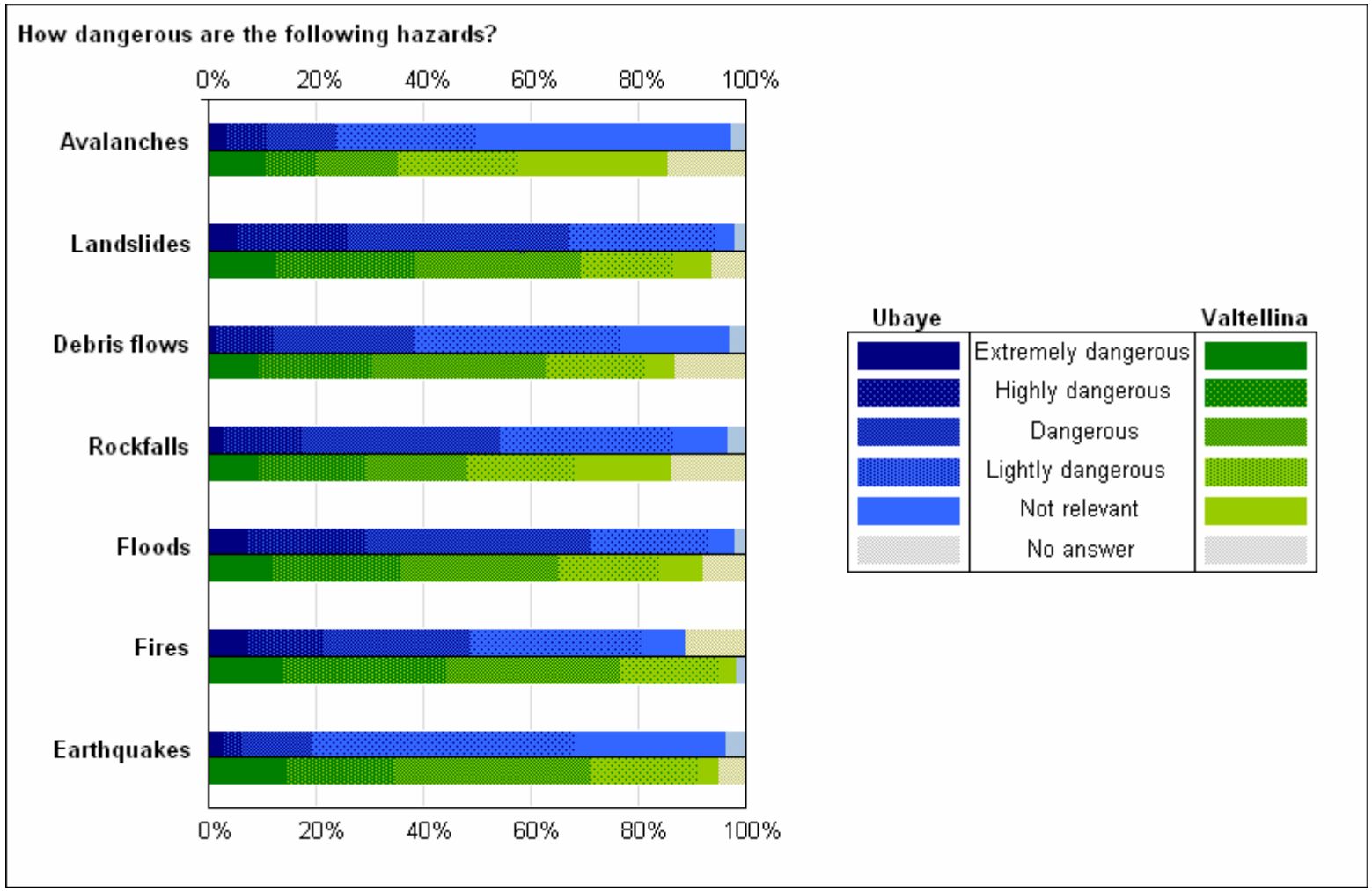

Are you concerned about natural risks in your community?
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average

Question: In your opinion, how dangerous are the following hazards in your community?

++	Extremely dangerous
+	Highly dangerous
+/-	Dangerous
-	Lightly dangerous
--	Not relevant for the area

		Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes
		Ubaye						
++	**Extremely dangerous**	10%	12%	9%	9%	11%	7%	15%
+	**Highly dangerous**	10%	26%	21%	20%	24%	14%	20%
+/-	**Dangerous**	15%	31%	33%	19%	29%	28%	36%
-	**Lightly dangerous**	23%	17%	18%	20%	19%	32%	20%
--	**Not relevant**	27%	7%	6%	18%	8%	8%	3%
#	**No answer**	15%	6%	13%	14%	8%	11%	5%
	Total	100%	100%	100%	100%	100%	100%	100%

		Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes
		Valtellina						
++	**Extremely dangerous**	3%	5%	1%	3%	7%	14%	2%
+	**Highly dangerous**	7%	21%	11%	15%	22%	31%	4%
+/-	**Dangerous**	13%	41%	27%	37%	42%	33%	13%
-	**Lightly dangerous**	26%	28%	38%	32%	22%	18%	49%
--	**Not relevant**	47%	3%	20%	10%	5%	3%	28%
#	**No answer**	3%	2%	3%	3%	2%	2%	4%
	Total	100%	100%	100%	100%	100%	100%	100%


How dangerous are the following hazards?
0%
20%
40%
60%
80%
100%
Avalanches
Landslides
Debris flows
Rockfalls
Floods
Fires
Earthquakes
Ubaye
Valtellina
Extremely dangerous
Highly dangerous
Dangerous
Lightly dangerous
Not relevant
No answer

Crossing this question with age by use of indices

Age group	Ubaye: Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes	Valtellina: Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes
Sample	2,46	3,20	3,12	2,80	3,13	2,78	3,23	1,90	2,97	2,33	2,67	3,05	3,34	2,00
15 to 29	3,42	3,31	3,00	3,36	3,25	3,03	3,03	2,06	3,02	2,30	2,76	3,06	3,30	2,01
30 to 44	2,52	3,33	3,21	2,93	3,00	2,89	3,35	1,78	2,98	2,41	2,70	3,07	3,36	2,03
45 to 59	2,28	3,13	3,07	2,52	3,07	2,75	3,31	1,60	2,83	2,44	2,45	3,01	3,35	2,06
60 to 74	2,00	3,12	3,09	2,64	3,16	2,57	3,13	1,31	2,81	2,13	2,25	2,89	3,69	1,33
75 to 89	2,88	3,12	3,27	3,00	3,48	2,83	3,07	1,17	3,17	2,00	2,00	3,17	4,00	1,83
90 and +	-	4,00	4,00	-	4,00	-	4,00	-	-	-	-	-	-	-

Crossing this question with gender by the use of indices

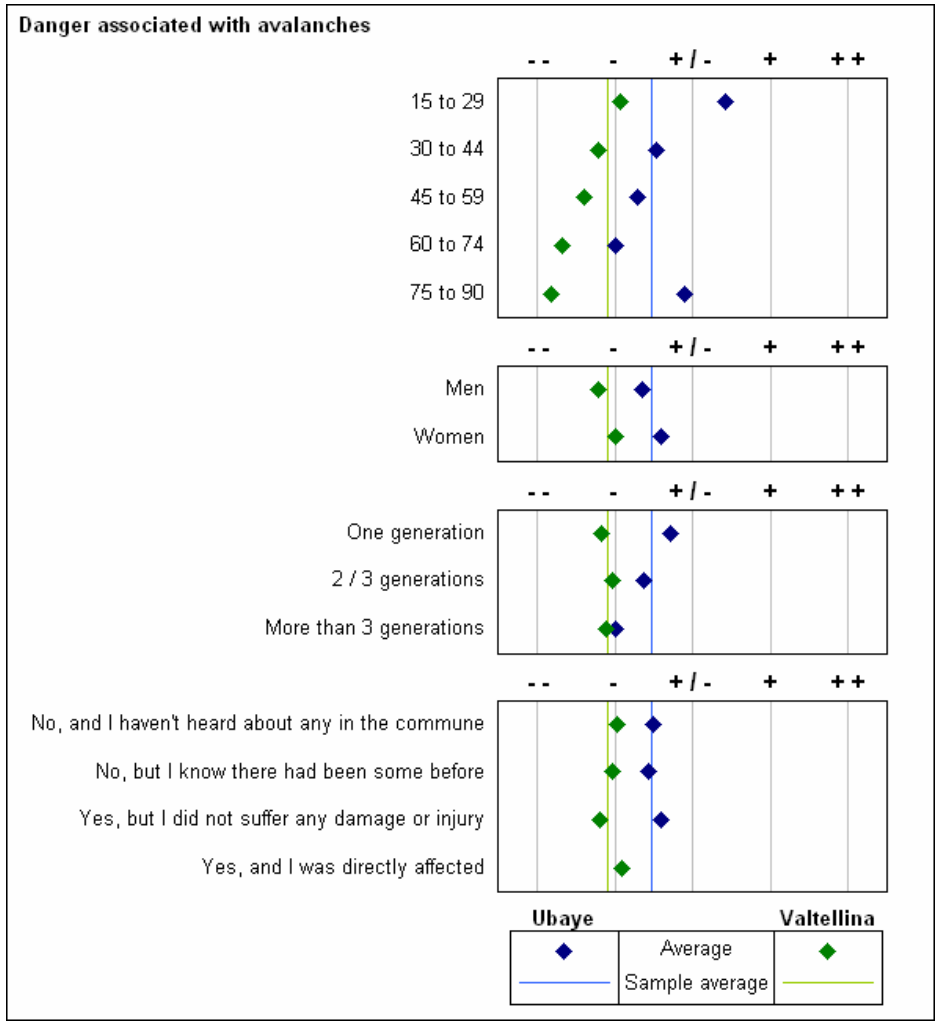
Gender	Ubaye: Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes	Valtellina: Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes
Sample	2,46	3,20	3,12	2,80	3,13	2,78	3,23	1,90	2,97	2,33	2,67	3,05	3,34	2,00
Men	2,34	3,11	3,14	2,60	3,12	2,67	3,09	1,78	2,82	2,32	2,52	2,95	3,23	1,84
Women	2,59	3,31	3,09	3,01	3,13	2,91	3,38	1,99	3,08	2,34	2,78	3,13	3,42	2,12

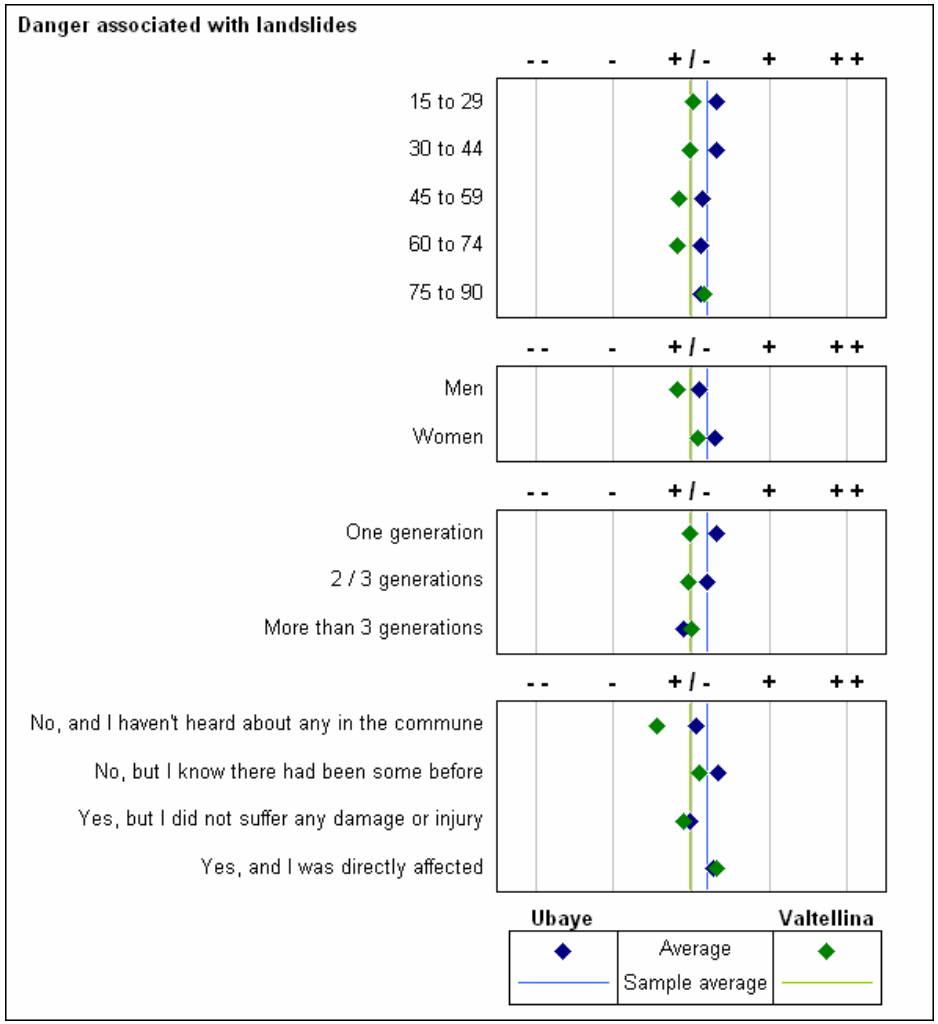
Crossing this question with ancientness in the valley (in generations) by the use of indices

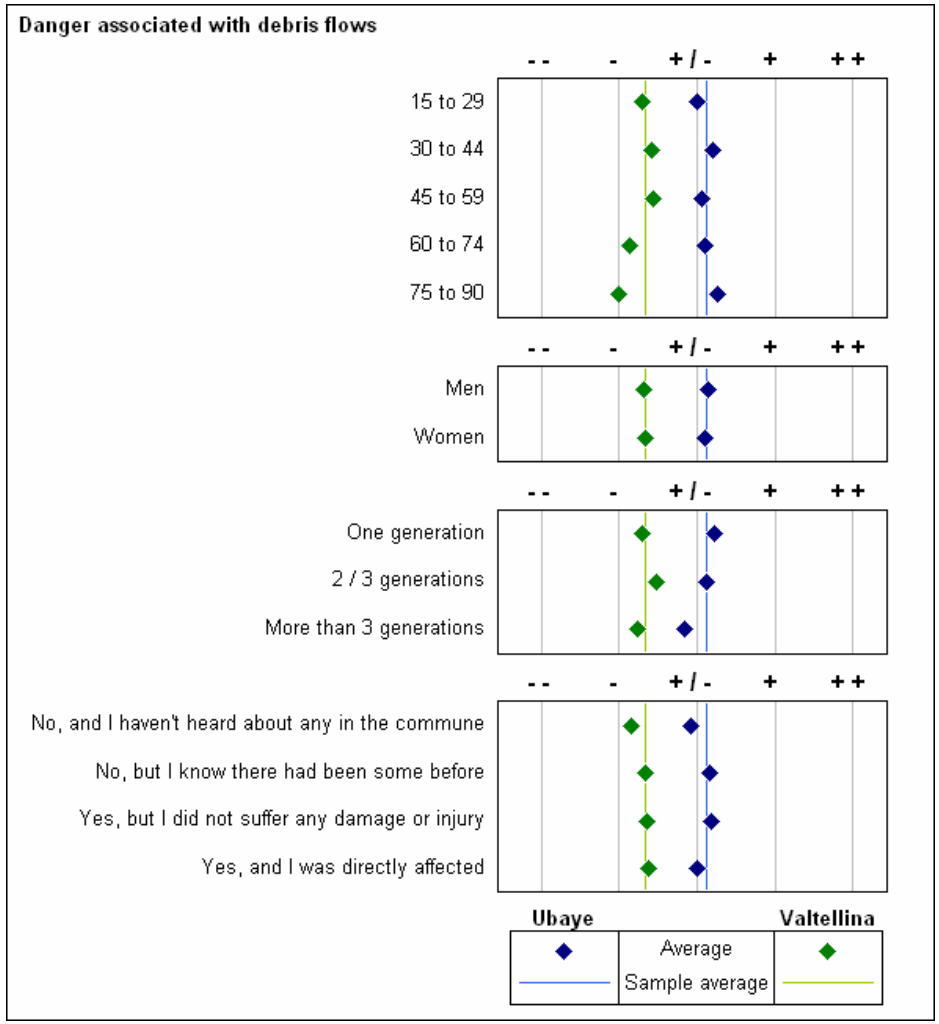
Ancientness	Ubaye							Valtellina						
	Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes	Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes
Sample	2,46	3,20	3,12	2,80	3,13	2,78	3,23	1,90	2,97	2,33	2,67	3,05	3,34	2,00
One generation	2,70	3,33	3,23	3,08	3,15	2,77	3,24	1,82	2,98	2,30	2,58	3,29	3,42	2,30
Two or three generations	2,36	3,20	3,12	2,66	2,96	2,96	3,21	1,96	2,96	2,48	2,77	3,07	3,23	2,04
More than three generations	2,00	2,89	2,84	2,26	3,21	2,64	3,24	1,60	2,83	2,44	2,45	3,01	3,35	2,06

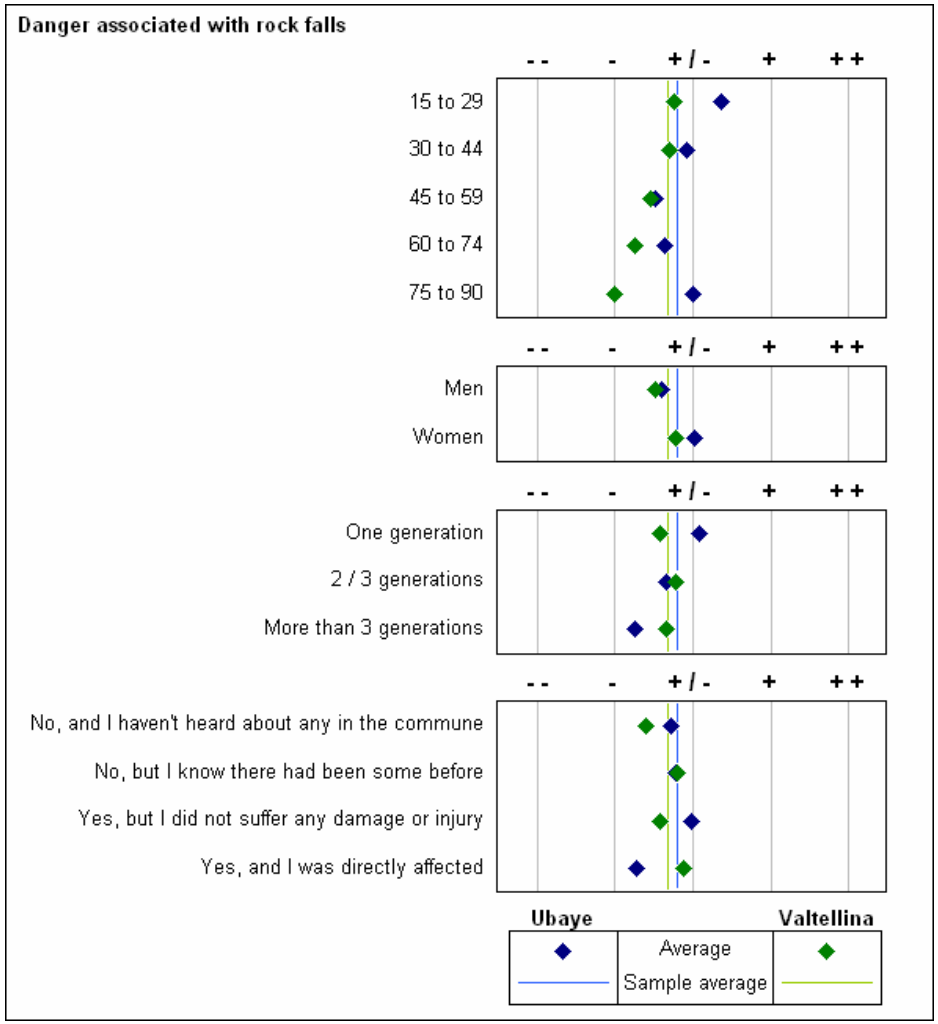
Crossing this question with former experiences with natural disasters by the use of indices

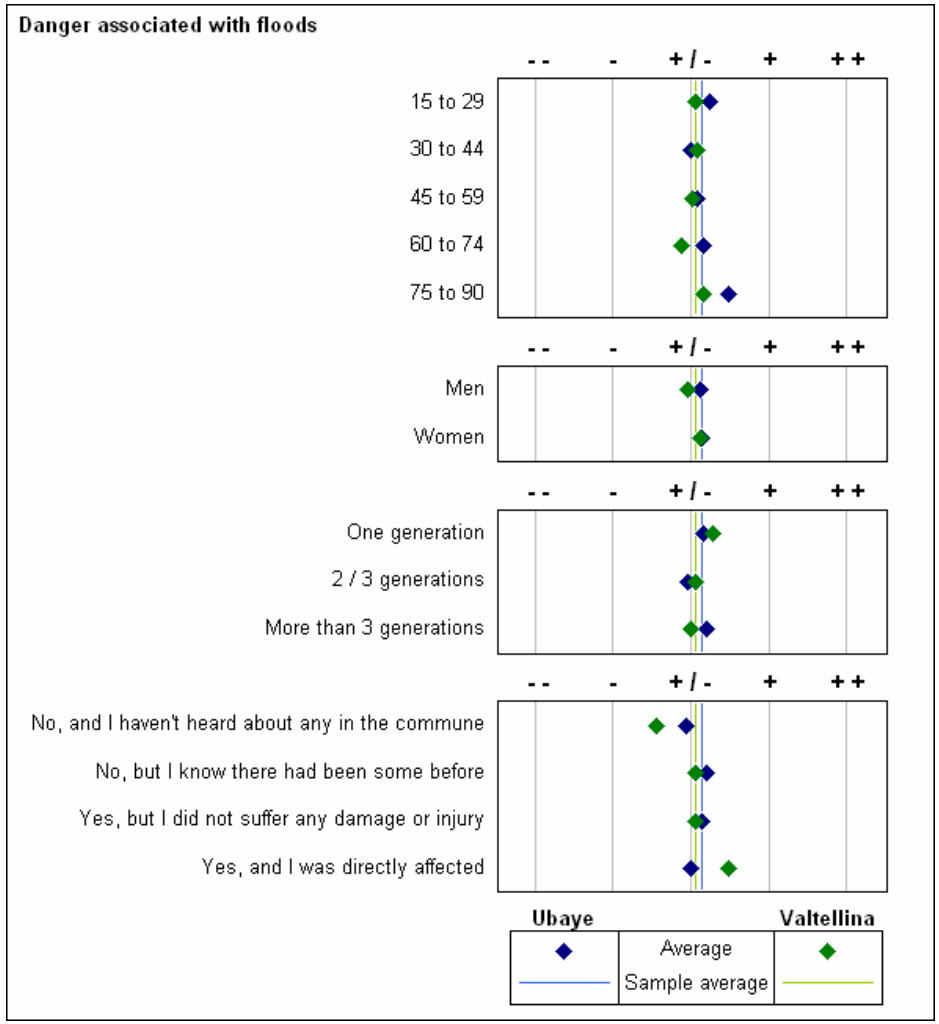
Experience with disaster	Ubaye							Valtellina						
	Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes	Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes
Sample	2,46	3,20	3,12	2,80	3,13	2,78	3,23	1,90	2,97	2,33	2,67	3,05	3,34	2,00
No, and I haven't heard about any in the commune	2,49	3,05	2,92	2,72	2,94	2,92	3,30	2,02	2,55	2,15	2,40	2,56	3,08	2,03
No, but I know there had been some before	2,42	3,33	3,16	2,78	3,20	2,79	3,22	1,97	3,10	2,34	2,80	3,07	3,25	2,02
Yes, but I didn't suffer any damage or injury	2,58	2,97	3,18	2,97	3,14	2,74	3,22	1,80	2,89	2,35	2,58	3,06	3,42	1,93
Yes, and I was directly affected	2,09	3,27	3,00	2,27	3,00	2,09	3,27	2,09	3,32	2,38	2,88	3,49	3,69	2,32

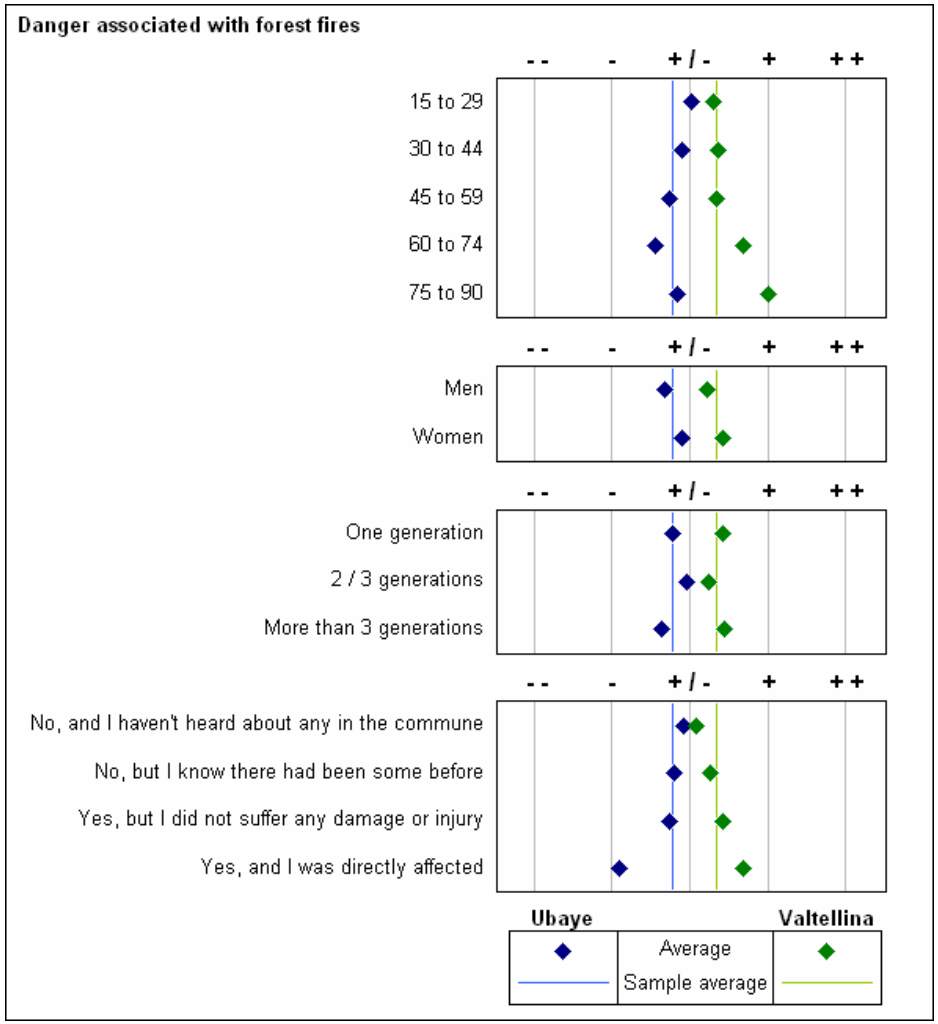

Danger associated with avalanches
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average

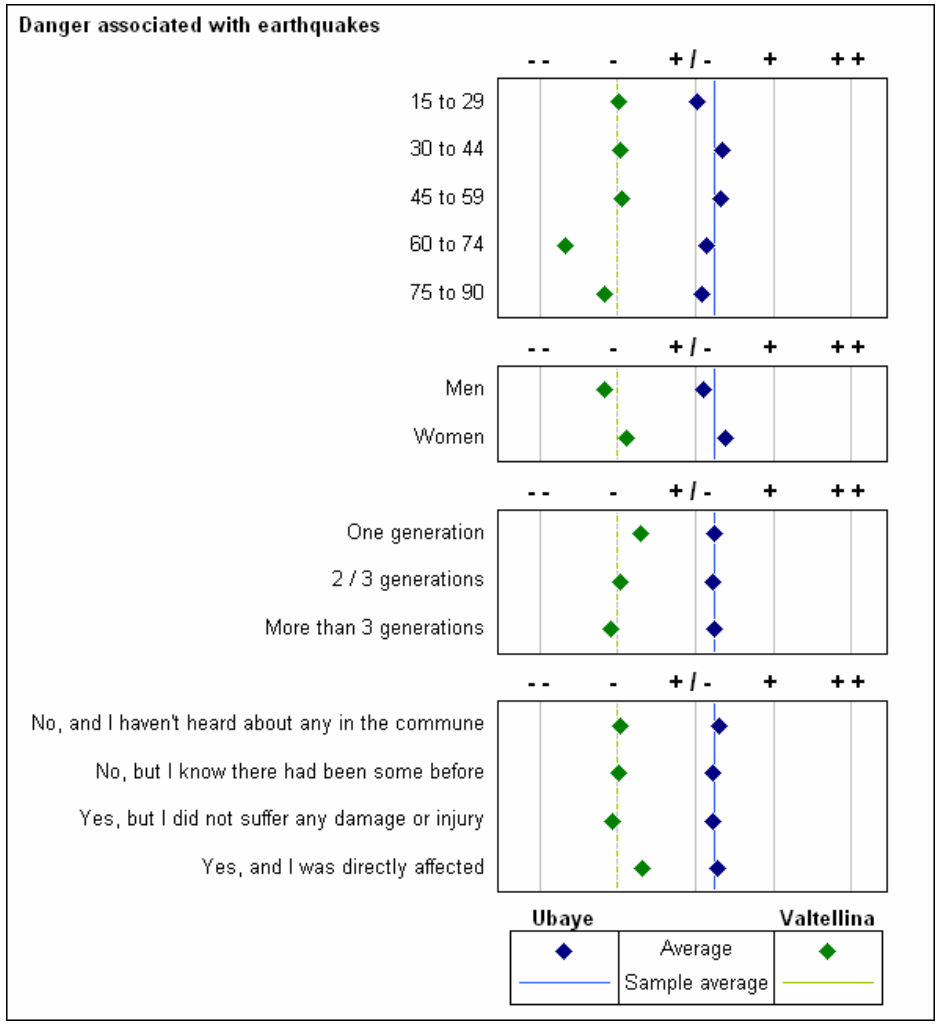

Danger associated with landslides
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average


Danger associated with debris flows
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average


Danger associated with rock falls
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average

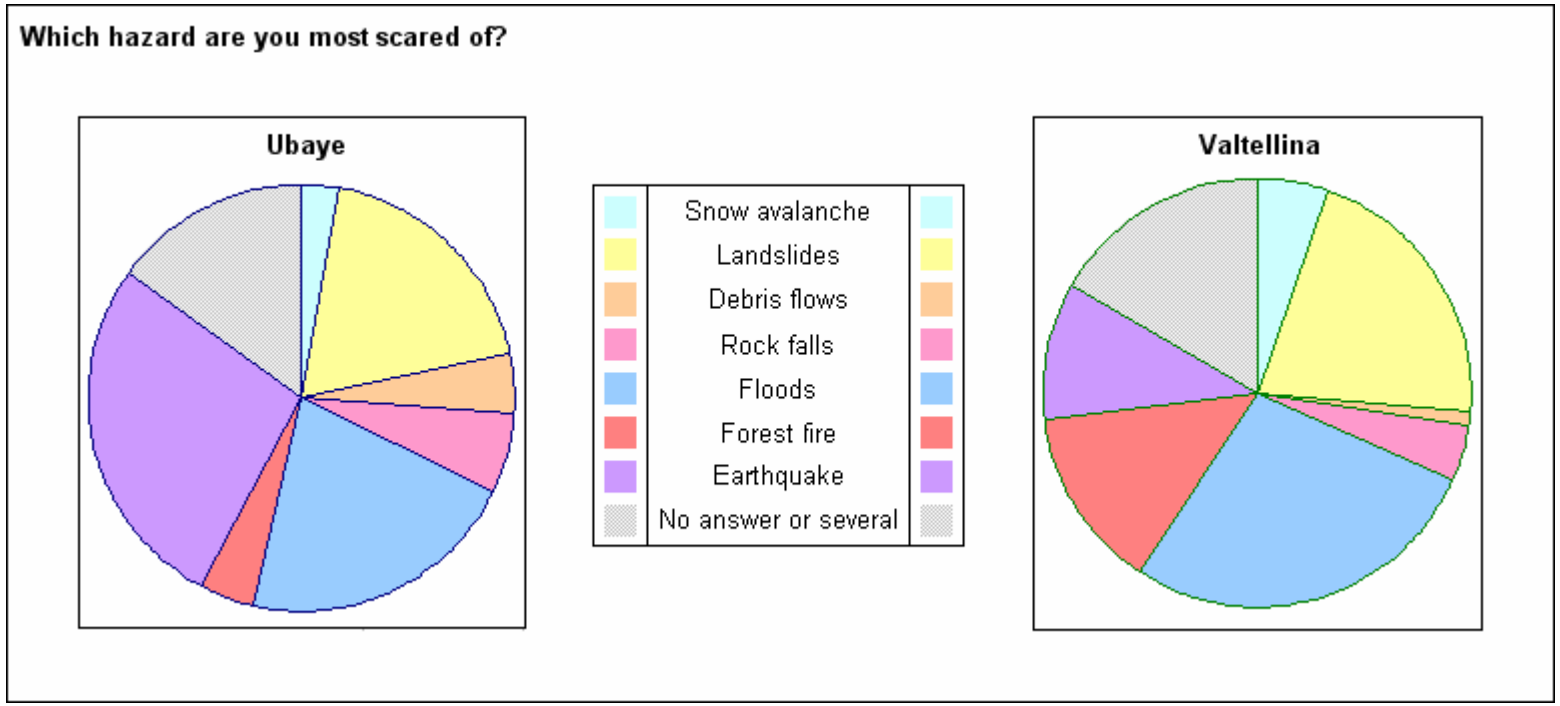

Danger associated with floods
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average


Danger associated with forest fires
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average


Danger associated with earthquakes
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average

Question: Which of these hazards scares you the most?

Most scary hazard	Ubaye		Valtellina	
Snow avalanches	10	3%	26	5%
Landslides	65	19%	101	21%
Debris flows	15	4%	6	1%
Rock falls	21	6%	20	4%
Floods	73	21%	133	28%
Forest fires	15	4%	67	14%
Earthquakes	93	27%	50	10%
No answer or several	52	15%	80	17%
Total	344	100%	483	100%



Crossing this question with age

Age group	Ubaye: Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes	No answer / several
Sample	3%	19%	4%	6%	21%	4%	27%	15%
15 to 29	14%	14%	0%	19%	19%	11%	19%	3%
30 to 44	2%	14%	8%	5%	18%	5%	29%	19%
45 to 59	1%	15%	5%	4%	27%	1%	35%	11%
60 to 74	2%	24%	2%	3%	21%	5%	21%	21%
75 to 89	0%	33%	3%	10%	13%	3%	23%	13%
90 and +	0%	50%	0%	0%	50%	0%	0%	0%

Age group	Valtellina: Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes	No answer / several
Sample	5%	21%	1%	4%	28%	14%	10%	17%
15 to 29	7%	20%	2%	5%	26%	16%	8%	16%
30 to 44	3%	24%	0%	3%	27%	9%	15%	19%
45 to 59	3%	20%	1%	2%	30%	12%	14%	18%
60 to 74	0%	33%	0%	0%	33%	11%	6%	17%
75 to 89	0%	17%	0%	0%	50%	17%	17%	0%
90 and +	-	-	-	-	-	-	-	-

Crossing this question with gender

Gender	Ubaye: Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes	No answer / several
Sample	3%	19%	4%	6%	21%	4%	27%	15%
Men	3%	21%	4%	6%	24%	6%	21%	15%
Women	3%	17%	5%	6%	17%	3%	34%	16%

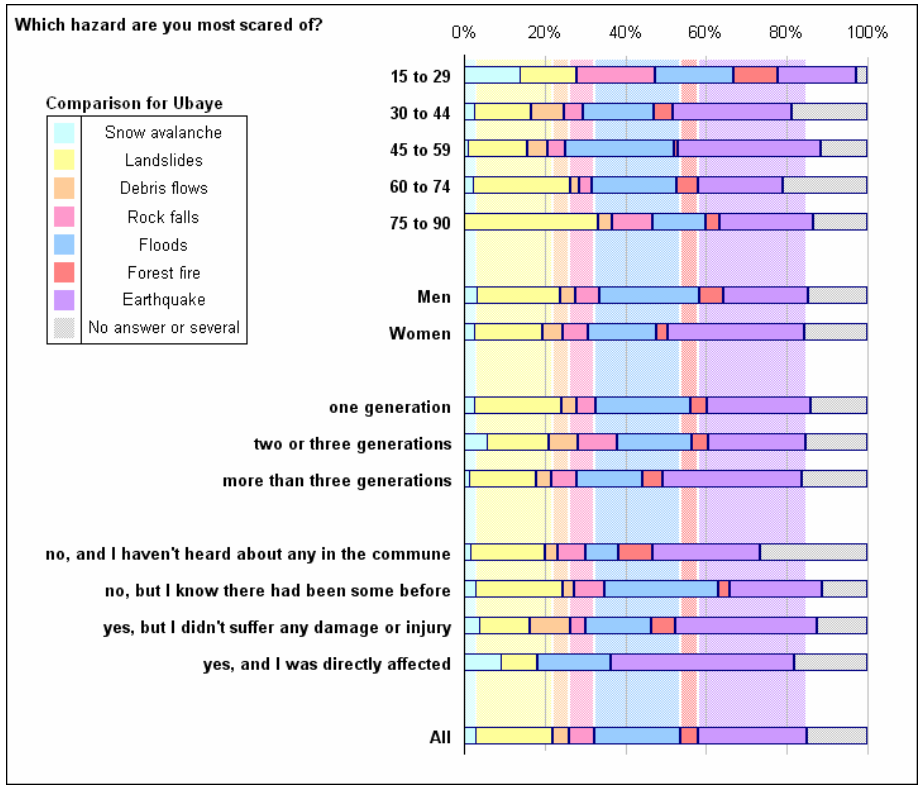
Gender	Valtellina: Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes	No answer / several
Sample	5%	21%	1%	4%	28%	14%	10%	17%
Men	5%	19%	1%	3%	30%	16%	8%	17%
Women	5%	23%	1%	5%	26%	12%	12%	16%

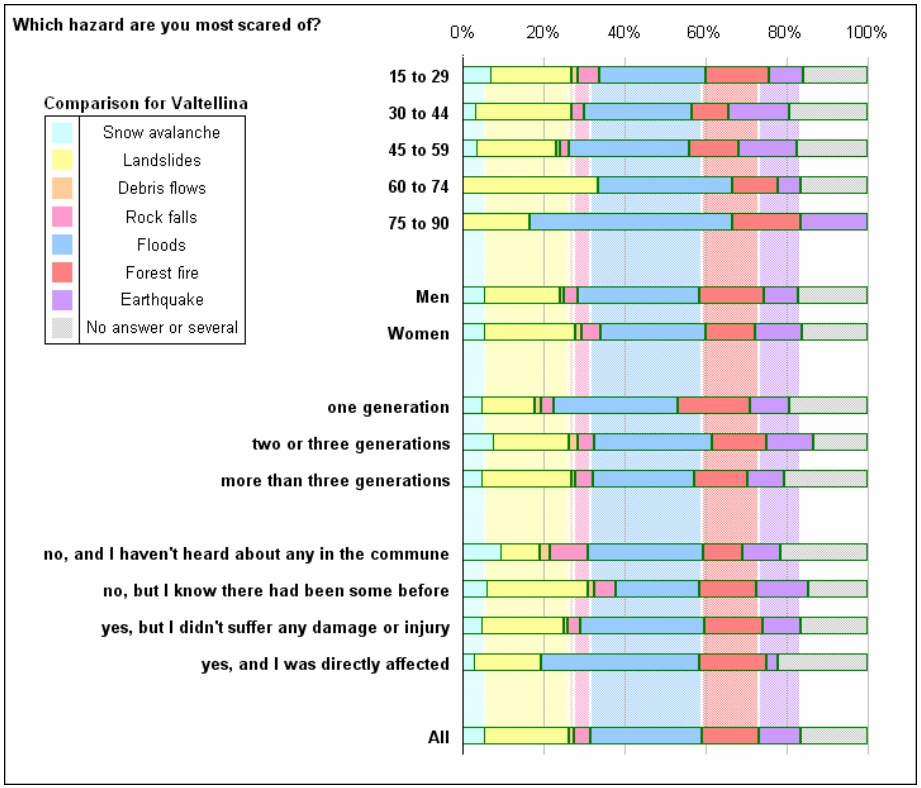
Crossing this question with ancientness in the valley (in generations)

Ancientness	Ubaye								Valtellina							
	Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes	No answer / several	Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes	No answer / several
Sample	3%	19%	4%	6%	21%	4%	27%	15%	5%	21%	1%	4%	28%	14%	10%	17%
One generation	3%	21%	4%	5%	24%	4%	26%	14%	5%	13%	2%	3%	31%	18%	10%	19%
Two or three generations	6%	15%	7%	10%	18%	4%	24%	15%	7%	19%	2%	4%	29%	14%	11%	14%
More than three generations	1%	16%	4%	6%	16%	5%	34%	16%	5%	22%	1%	4%	25%	13%	9%	21%

Crossing this question with former experiences with natural disasters

Experience with disaster	Ubaye								Valtellina							
	Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes	No answer / several	Snow avalanches	Landslides	Debris flows	Rockfalls	Floods	Forest fires	Earthquakes	No answer / several
Sample	3%	19%	4%	6%	21%	4%	27%	15%	5%	21%	1%	4%	28%	14%	10%	17%
No, and I haven't heard about any in the commune	14%	14%	0%	19%	19%	11%	19%	3%	7%	20%	2%	5%	26%	16%	8%	16%
No, but I know there had been some before	2%	14%	8%	5%	18%	5%	29%	19%	3%	24%	0%	3%	27%	9%	15%	19%
Yes, but I didn't suffer any damage or injury	0%	33%	3%	10%	13%	3%	23%	13%	0%	17%	0%	0%	50%	17%	17%	0%
Yes, and I was directly affected	0%	50%	0%	0%	50%	0%	0%	0%	-	-	-	-	-	-	-	-


Which hazard are you most scared of?
0%
20%
40%
60%
80%
100%
Comparison for Ubaye
Snow avalanche
Landslides
Debris flows
Rock falls
Floods
Forest fire
Earthquake
No answer or several
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
one generation
two or three generations
more than three generations
no, and I haven't heard about any in the commune
no, but I know there had been some before
yes, but I didn't suffer any damage or injury
yes, and I was directly affected
All


Which hazard are you most scared of?
0%
20%
40%
60%
80%
100%
Comparison for Valtellina
Snow avalanche
Landslides
Debris flows
Rock falls
Floods
Forest fire
Earthquake
No answer or several
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
one generation
two or three generations
more than three generations
no, and I haven't heard about any in the commune
no, but I know there had been some before
yes, but I didn't suffer any damage or injury
yes, and I was directly affected
All

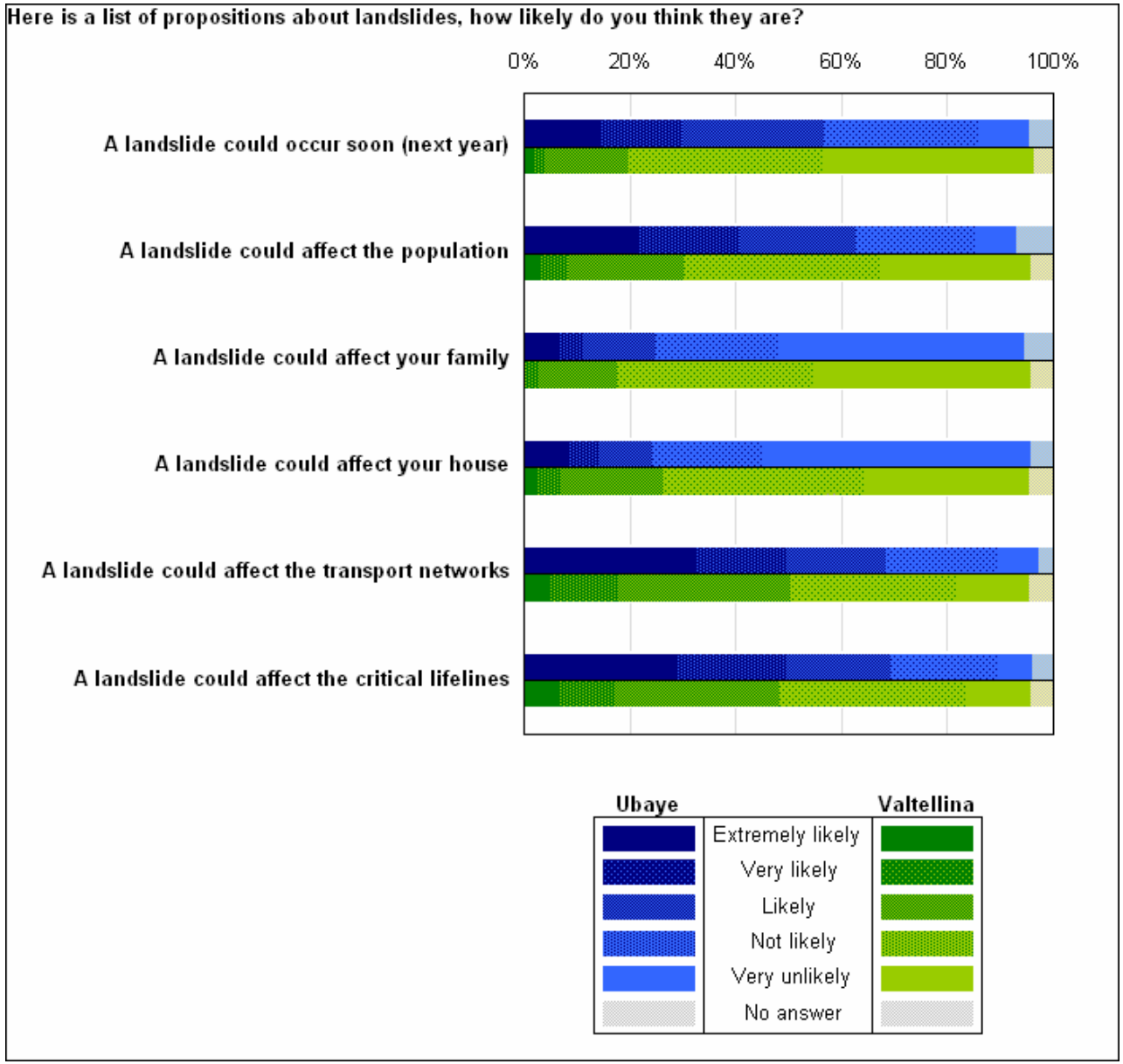
Question: Please read the following statements about landslides in your community, and indicate how likely you think they are.

++	Extremely likely
+	Very likely
+/-	Likely
-	Not likely
--	Very unlikely
#	No answer

a.	A landslide could occur soon (next year)
b.	A landslide could affect the population
c.	A landslide could affect your family
d.	A landslide could affect your house
e.	A landslide could affect the transport networks
f.	A landslide could affect the critical lifelines

		Ubaye					
		a.	**b.**	**c.**	**d.**	**e.**	**f.**
++	**Extremely likely**	15%	22%	6%	8%	33%	29%
+	**Very likely**	15%	19%	5%	6%	17%	21%
+/-	**Likely**	27%	22%	14%	10%	19%	20%
-	**Not likely**	29%	23%	24%	21%	21%	20%
--	**Very unlikely**	10%	8%	46%	51%	8%	6%
#	**No answer**	4%	7%	6%	4%	3%	4%
	Total	100%	100%	100%	100%	100%	100%

		Valtellina					
		a.	**b.**	**c.**	**d.**	**e.**	**f.**
++	**Extremely likely**	2%	3%	0%	2%	5%	6%
+	**Very likely**	2%	6%	2%	5%	13%	11%
+/-	**Likely**	16%	22%	15%	20%	33%	31%
-	**Not likely**	37%	37%	38%	38%	32%	35%
--	**Very unlikely**	39%	28%	40%	31%	13%	12%
#	**No answer**	4%	4%	4%	5%	5%	4%
	Total	100%	100%	100%	100%	100%	100%


Here is a list of propositions about landslides, how likely do you think they are?
0%
20%
40%
60%
80%
100%
A landslide could occur soon (next year)
A landslide could affect the population
A landslide could affect your family
A landslide could affect your house
A landslide could affect the transport networks
A landslide could affect the critical lifelines
Ubaye
Valtellina
Extremely likely
Very likely
Likely
Not likely
Very unlikely
No answer

Crossing this question with age by use of indices

Age groups	Ubaye a.	Ubaye b.	Ubaye c.	Ubaye d.	Ubaye e.	Ubaye f.	Valtellina a.	Valtellina b.	Valtellina c.	Valtellina d.	Valtellina e.	Valtellina f.
Sample	2,96	3,26	1,97	1,96	3,47	3,47	1,86	2,14	1,80	2,05	2,62	2,63
15 to 29	2,72	3,50	2,36	2,11	3,94	3,78	1,84	2,19	1,82	2,15	2,71	2,74
30 to 44	2,93	3,54	2,23	2,15	3,78	3,76	2,22	2,25	1,87	1,97	2,51	2,59
45 to 59	3,05	3,29	2,00	1,89	3,43	3,51	1,75	1,95	1,73	1,82	2,44	2,33
60 to 74	2,97	2,93	1,59	1,73	3,18	3,05	1,50	1,62	1,46	1,62	2,38	2,33
75 to 89	2,96	2,96	1,73	2,15	3,04	3,35	1,67	2,17	1,67	2,17	2,50	2,33
90 and +	2,72	3,50	2,36	2,11	3,94	3,78	1,84	2,19	1,82	2,15	2,71	2,74

Crossing this question with gender by the use of indices

	Ubaye a.	Ubaye b.	Ubaye c.	Ubaye d.	Ubaye e.	Ubaye f.	Valtellina a.	Valtellina b.	Valtellina c.	Valtellina d.	Valtellina e.	Valtellina f.
Sample	2,96	3,26	1,97	1,96	3,47	3,47	1,86	2,14	1,80	2,05	2,62	2,63
Men	2,81	3,08	1,79	1,83	3,24	3,29	1,71	2,08	1,67	1,88	2,63	2,56
Women	3,13	3,48	2,18	2,13	3,75	3,68	1,98	2,18	1,89	2,18	2,62	2,68

Crossing this question with ancientness in the valley (in generations) by the use of indices

Ancientness	Ubaye a.	Ubaye b.	Ubaye c.	Ubaye d.	Ubaye e.	Ubaye f.	Valtellina a.	Valtellina b.	Valtellina c.	Valtellina d.	Valtellina e.	Valtellina f.
Sample	2,96	3,26	1,97	1,96	3,47	3,47	1,86	2,14	1,80	2,05	2,62	2,63
One generation	3,02	3,39	2,06	2,09	3,59	3,64	1,88	2,03	1,75	1,92	2,53	2,58
Two or three generations	2,75	3,13	1,79	1,81	3,24	3,25	1,83	2,17	1,80	2,13	2,57	2,62
More than three generations	3,03	3,08	1,96	1,83	3,41	3,27	1,84	2,14	1,76	2,05	2,69	2,67

Crossing this question with former experiences with natural disasters by the use of indices

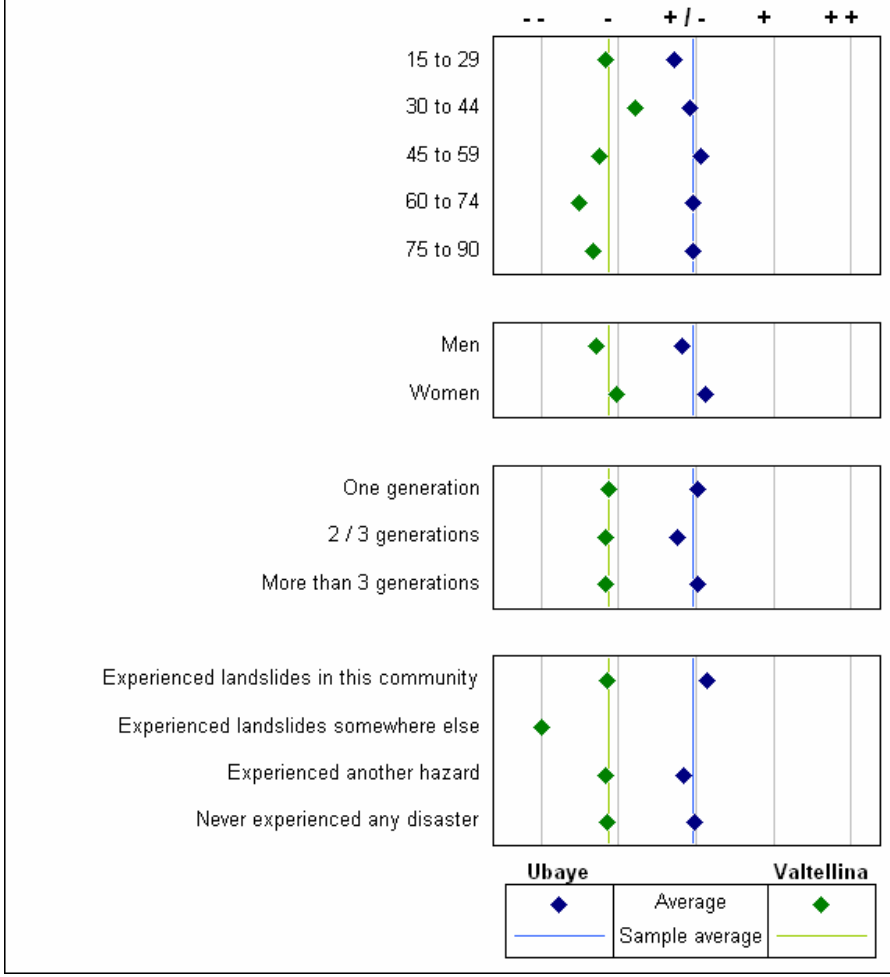
Experience with disasters	a.	b.	c.	d.	e.	f.
	Ubaye					
Sample	2,96	3,26	1,97	1,96	3,47	3,47
Experienced landslides in Ubaye / Valtellina	3,14	4,00	1,86	1,43	2,86	2,86
Experienced landslides somewhere else	-	-	-	-	-	-
Experienced another hazard	2,84	3,22	1,95	1,96	3,50	3,41
Never experienced a natural disaster	2,99	3,27	1,97	1,96	3,47	3,50

Experience with disasters	a.	b.	c.	d.	e.	f.
	Valtellina					
Sample	1,86	2,14	1,80	2,05	2,62	2,63
Experienced landslides in Ubaye / Valtellina	1,86	2,18	1,71	1,89	2,43	2,46
Experienced landslides somewhere else	1,00	1,00	1,00	1,00	1,00	1,00
Experienced another hazard	1,82	2,11	1,73	2,01	2,72	2,73
Never experienced a natural disaster	1,85	2,15	1,80	2,12	2,64	2,60

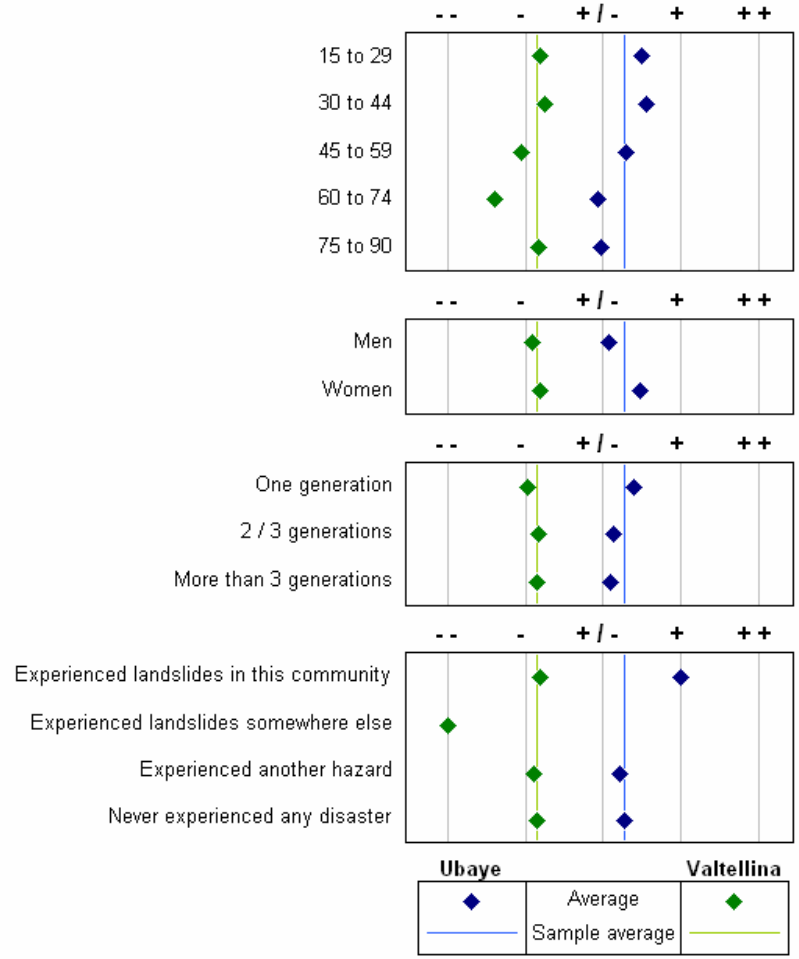
Experienced landslides in Ubaye	7	2%
Experienced landslides somewhere else	-	-
Experienced another hazard	84	24%
Never experienced a natural disaster	247	72%
Not enough details on hazard or location	6	2%

Experienced landslides in Valtellina	29	6%
Experienced landslides somewhere else	1	0,2%
Experienced another hazard	161	33%
Never experienced a natural disaster	232	48%
Not enough details on hazard or location	60	12%

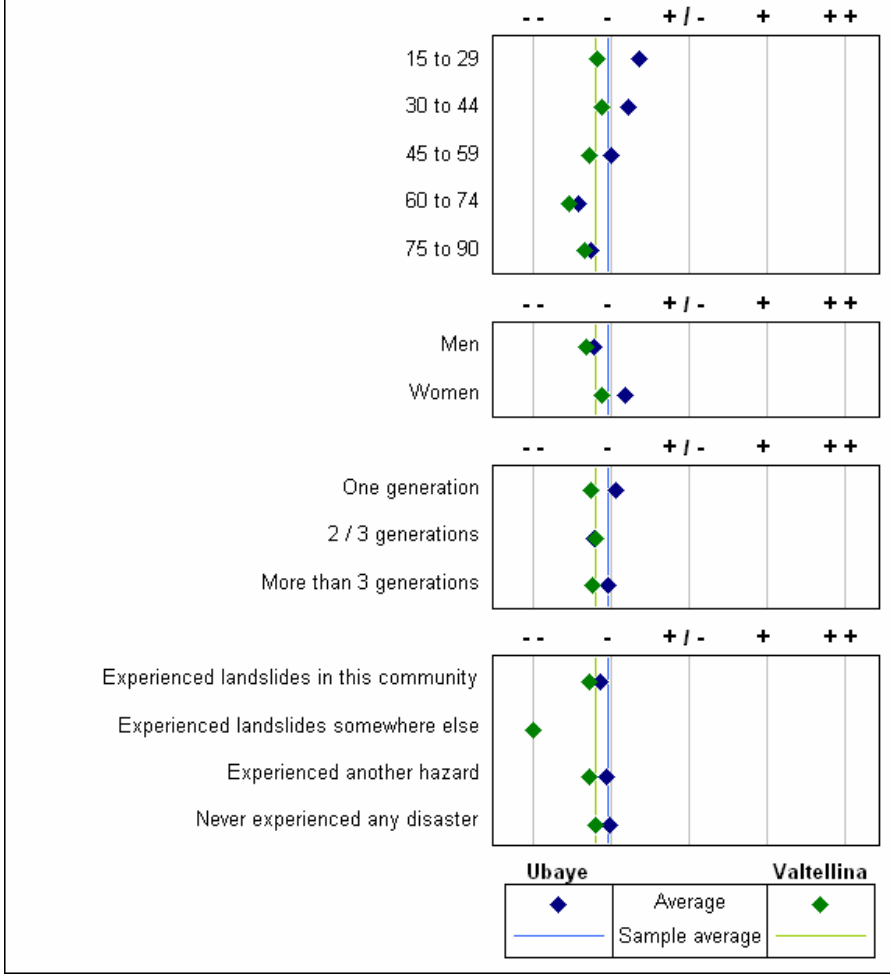
Please rate the likelihood of this statement:
"A landslide might occur soon in my community"



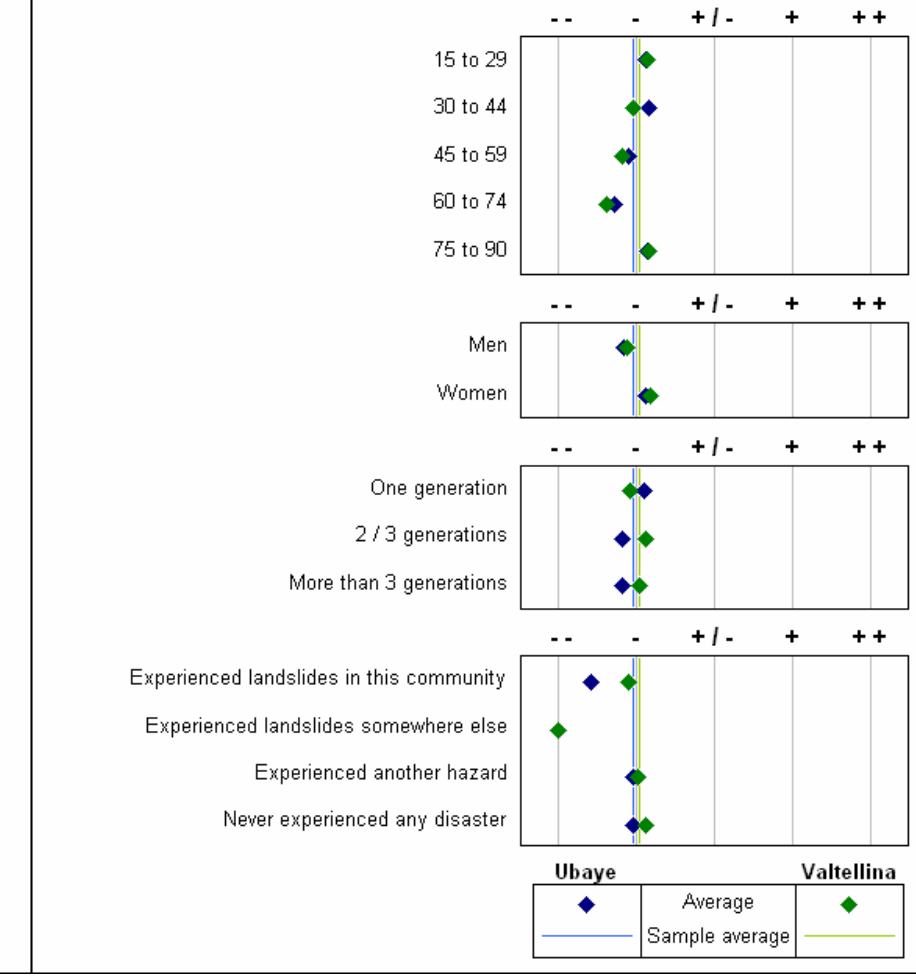
Please rate the likelihood of this statement:
"A landslide occurring in my community could affect the population"



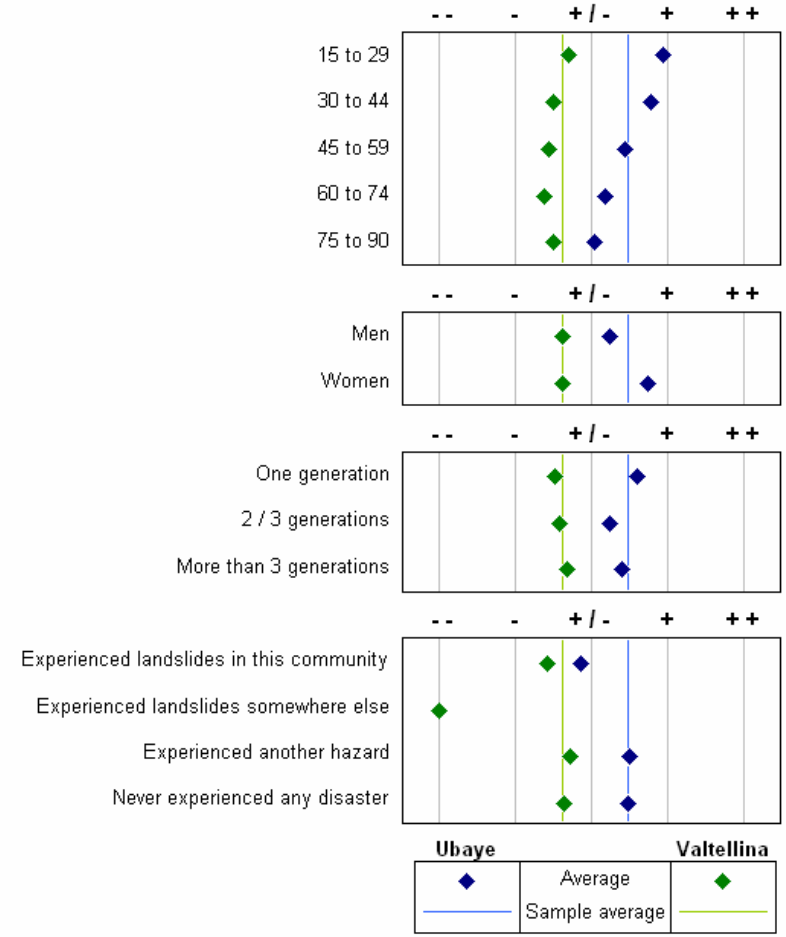
Please rate the likelihood of this statement:
"A landslide occurring in my community could affect my family"



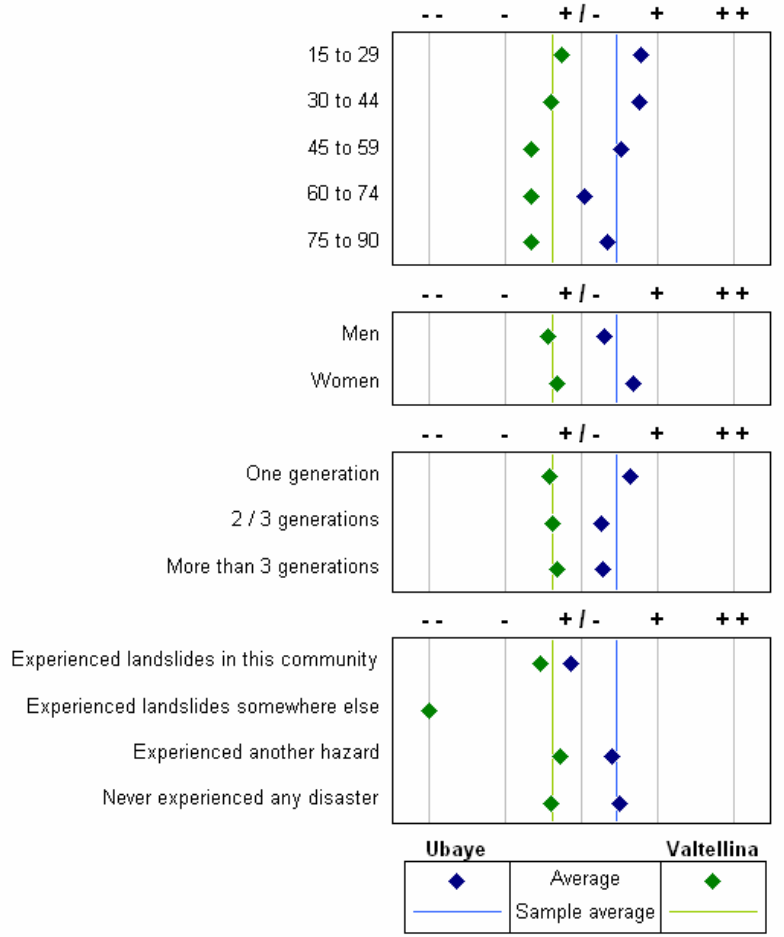
Please rate the likelihood of this statement:
"A landslide occurring in my community could affect my house"



Please rate the likelihood of this statement:
"A landslide occurring in my community could affect transport networks"



Please rate the likelihood of this statement:
"A landslide occurring in my community could affect critical lifelines"



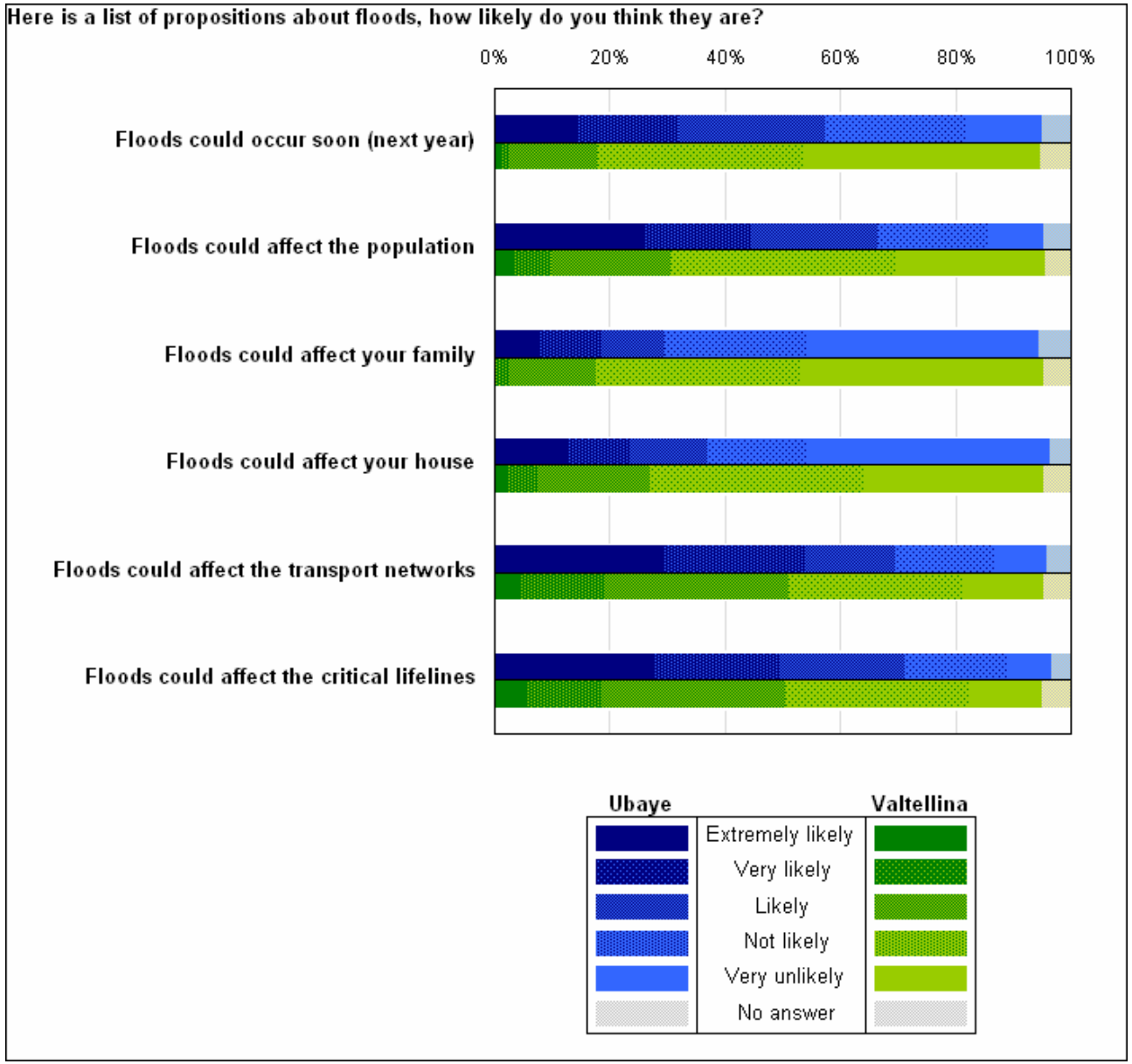
Question: Please read the following statements about floods in your community, and indicate how likely you think they are.

++	Extremely likely
+	Very likely
+/-	Likely
-	Not likely
--	Very unlikely
#	No answer

a.	Floods could occur soon (next year)
b.	Floods could affect the population
c.	Floods could affect your family
d.	Floods could affect your house
e.	Floods could affect the transport networks
f.	Floods could affect the critical lifelines

		a.	b.	c.	d.	e.	f.
		Ubaye					
++	**Extremely likely**	14%	26%	8%	13%	29%	27%
+	**Very likely**	18%	19%	11%	11%	25%	22%
+/-	**Likely**	26%	22%	11%	13%	16%	22%
-	**Not likely**	25%	19%	25%	18%	18%	18%
--	**Very unlikely**	13%	9%	40%	42%	9%	8%
#	**No answer**	5%	5%	6%	3%	4%	3%
	Total	100%	100%	100%	100%	100%	100%

		a.	b.	c.	d.	e.	f.
		Valtellina					
++	**Extremely likely**	1%	3%	0%	2%	5%	5%
+	**Very likely**	2%	7%	2%	5%	15%	13%
+/-	**Likely**	15%	21%	15%	20%	32%	32%
-	**Not likely**	36%	39%	36%	37%	31%	32%
--	**Very unlikely**	41%	26%	42%	31%	13%	12%
#	**No answer**	5%	4%	5%	5%	5%	5%
	Total	100%	100%	100%	100%	100%	100%


Here is a list of propositions about floods, how likely do you think they are?
0%
20%
40%
60%
80%
100%
Floods could occur soon (next year)
Floods could affect the population
Floods could affect your family
Floods could affect your house
Floods could affect the transport networks
Floods could affect the critical lifelines
Ubaye
Valtellina
Extremely likely
Very likely
Likely
Not likely
Very unlikely
No answer

Crossing this question with age by use of indices

Age groups	Ubaye a.	Ubaye b.	Ubaye c.	Ubaye d.	Ubaye e.	Ubaye f.	Valtellina a.	Valtellina b.	Valtellina c.	Valtellina d.	Valtellina e.	Valtellina f.
Sample	2,95	3,34	2,17	2,33	3,50	3,45	1,80	2,19	1,77	2,06	2,65	2,65
15 to 29	3,06	3,67	2,61	2,64	3,86	3,83	1,69	2,21	1,77	2,14	2,71	2,71
30 to 44	3,01	3,54	2,35	2,32	3,75	3,65	2,13	2,30	1,89	1,90	2,51	2,63
45 to 59	2,97	3,36	2,18	2,31	3,47	3,44	1,95	2,12	1,74	1,96	2,58	2,51
60 to 74	2,86	3,06	1,83	2,15	3,27	3,23	1,64	1,75	1,50	1,67	2,36	2,40
75 to 89	2,88	3,07	2,04	2,48	2,96	3,04	1,83	2,00	1,67	2,00	2,17	2,33
90 and +	3,00	3,00	2,00	3,50	4,00	4,00	-	-	-	-	-	-

Crossing this question with gender by the use of indices

	Ubaye a.	Ubaye b.	Ubaye c.	Ubaye d.	Ubaye e.	Ubaye f.	Valtellina a.	Valtellina b.	Valtellina c.	Valtellina d.	Valtellina e.	Valtellina f.
Sample	2,95	3,34	2,17	2,33	3,50	3,45	1,80	2,19	1,77	2,06	2,65	2,65
Men	2,92	3,18	2,03	2,27	3,38	3,37	1,64	2,13	1,61	1,92	2,59	2,57
Women	3,00	3,52	2,34	2,40	3,63	3,54	1,91	2,23	1,89	2,17	2,69	2,71

Crossing this question with ancientness in the valley (in generations) by the use of indices

Ancientness	Ubaye a.	Ubaye b.	Ubaye c.	Ubaye d.	Ubaye e.	Ubaye f.	Valtellina a.	Valtellina b.	Valtellina c.	Valtellina d.	Valtellina e.	Valtellina f.
Sample	2,95	3,34	2,17	2,33	3,50	3,45	1,80	2,19	1,77	2,06	2,65	2,65
One generation	2,98	3,29	2,14	2,33	3,51	3,47	1,95	2,24	1,75	1,97	2,73	2,66
Two or three generations	2,71	3,42	2,26	2,18	3,44	3,41	1,81	2,25	1,84	2,18	2,61	2,67
More than three generations	3,11	3,35	2,17	2,44	3,48	3,40	1,70	2,12	1,69	2,00	2,66	2,66

Crossing this question with former experiences with natural disasters by the use of indices

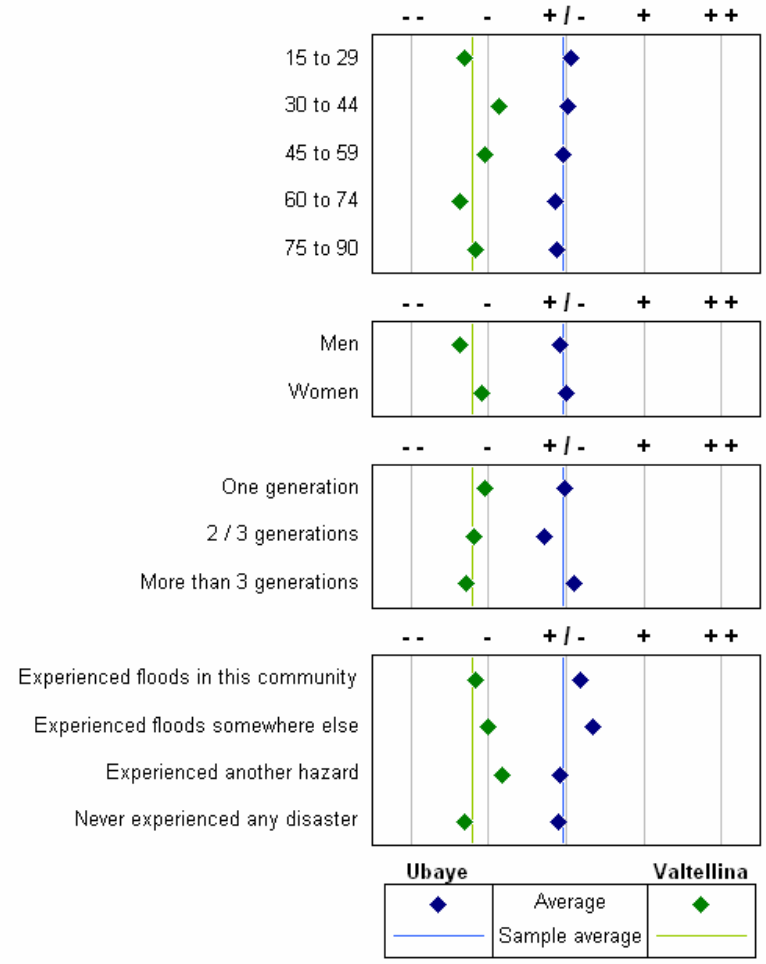
Experience with disasters	a.	b.	c.	d.	e.	f.
	Ubaye					
Sample	2,95	3,34	2,17	2,33	3,50	3,45
Experienced floods in Ubaye / Valtellina	3,19	3,24	2,39	2,73	3,75	3,68
Experienced floods somewhere else	3,33	3,50	2,25	2,58	3,58	3,75
Experienced another hazard	2,93	3,38	1,90	2,07	3,43	3,44
Never experienced a natural disaster	2,90	3,34	2,20	2,32	3,47	3,41

Experience with disasters	a.	b.	c.	d.	e.	f.
	Valtellina					
Sample	1,80	2,19	1,77	2,06	2,65	2,65
Experienced floods in Ubaye / Valtellina	1,83	2,14	1,77	2,02	2,66	2,66
Experienced floods somewhere else	2,00	2,00	2,00	2,00	3,00	3,00
Experienced another hazard	2,18	2,52	1,85	2,24	2,76	2,91
Never experienced a natural disaster	1,69	2,23	1,74	2,09	2,67	2,65

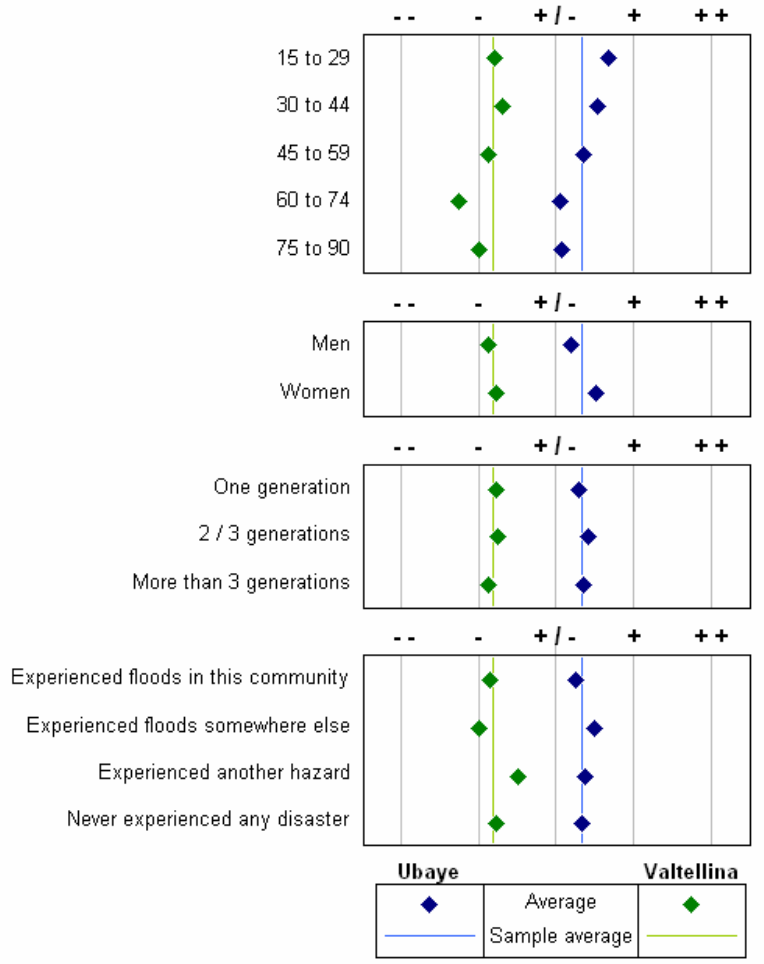
Experienced floods in Ubaye	37	11%
Experienced floods somewhere else	12	3%
Experienced another hazard	42	12%
Never experienced a natural disaster	247	72%
Not enough details on hazard or location	6	2%

Experienced floods in Valtellina	67	14%
Experienced floods somewhere else	1	0,2%
Experienced another hazard	35	7%
Never experienced a natural disaster	232	48%
Not enough details on hazard or location	148	31%

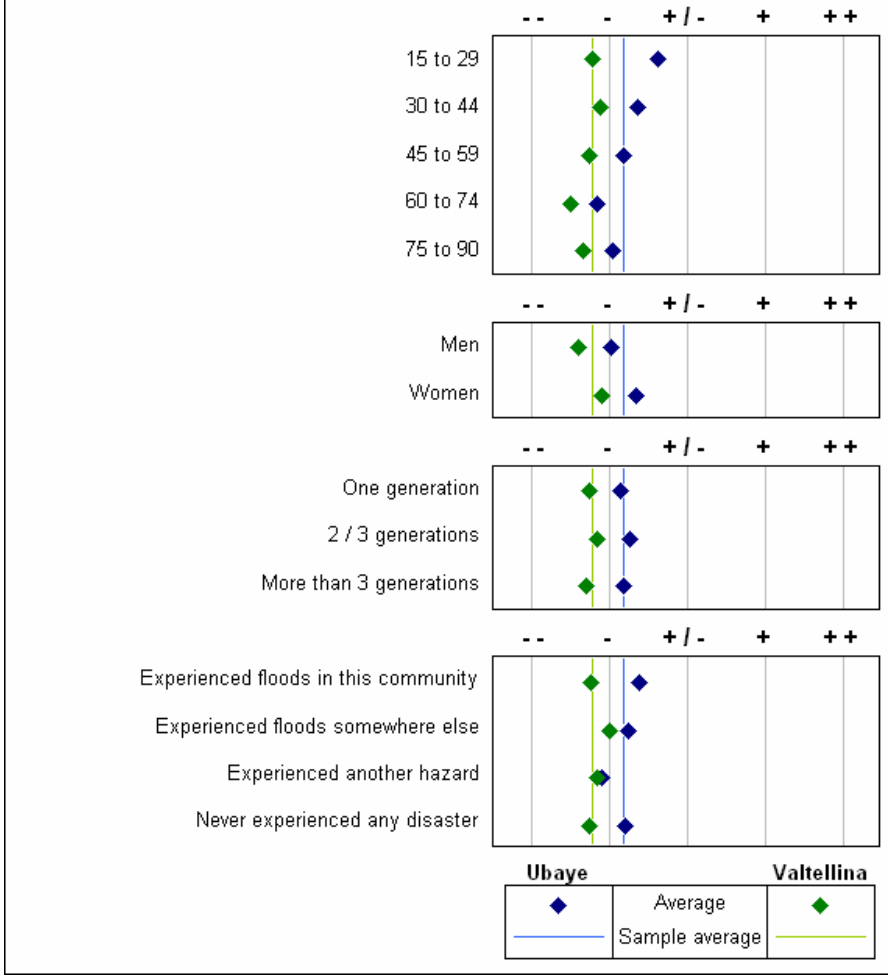
Please rate the likelihood of this statement:
"Floods might occur soon in my community"



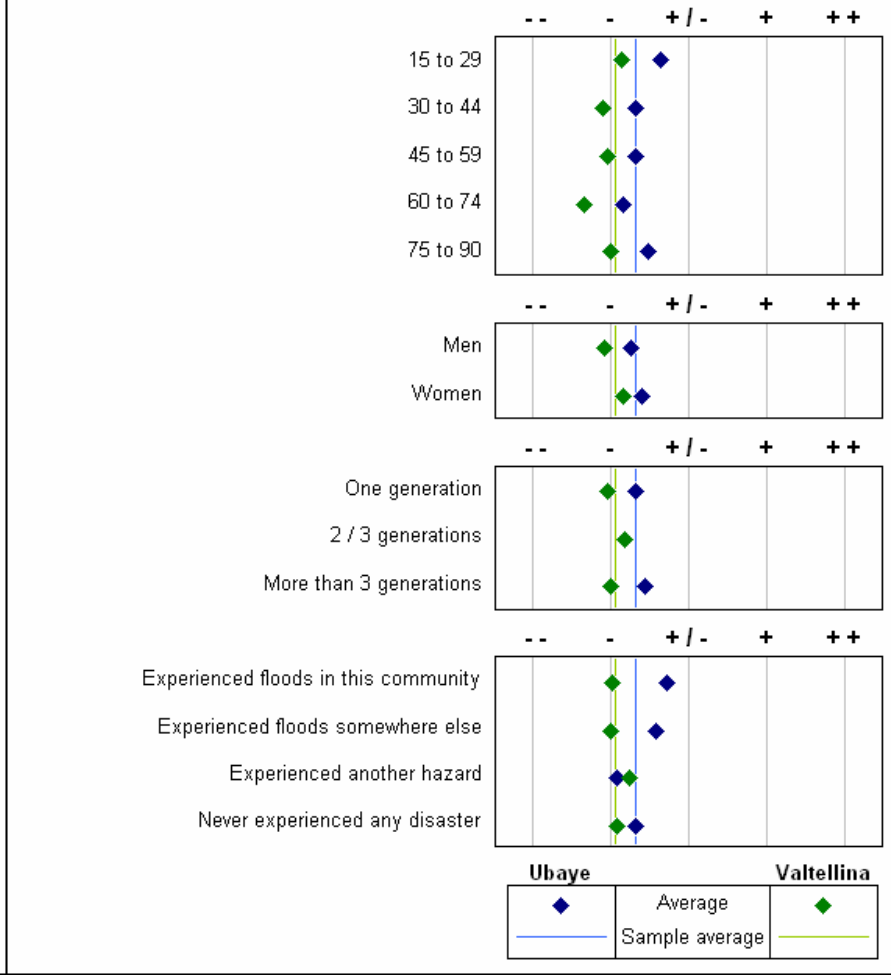
Please rate the likelihood of this statement:
"Floods occurring in my community could affect the population"



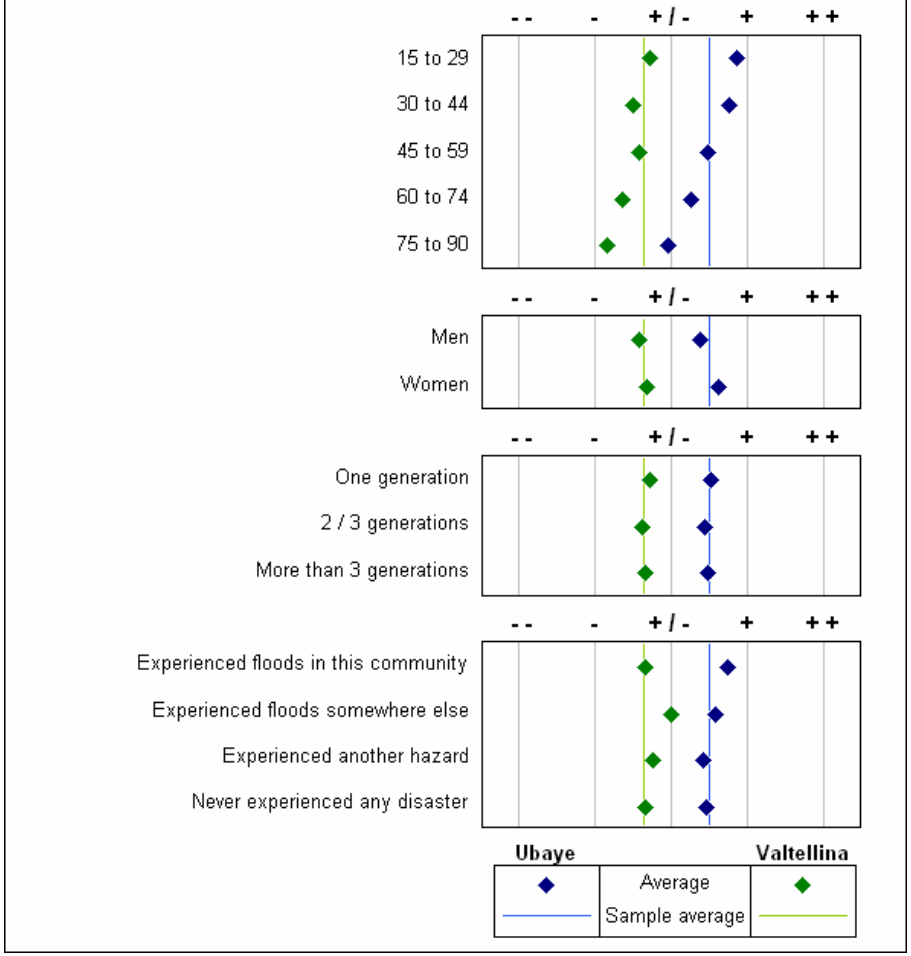
Please rate the likelihood of this statement:
"Floods occurring in my community could affect my family"



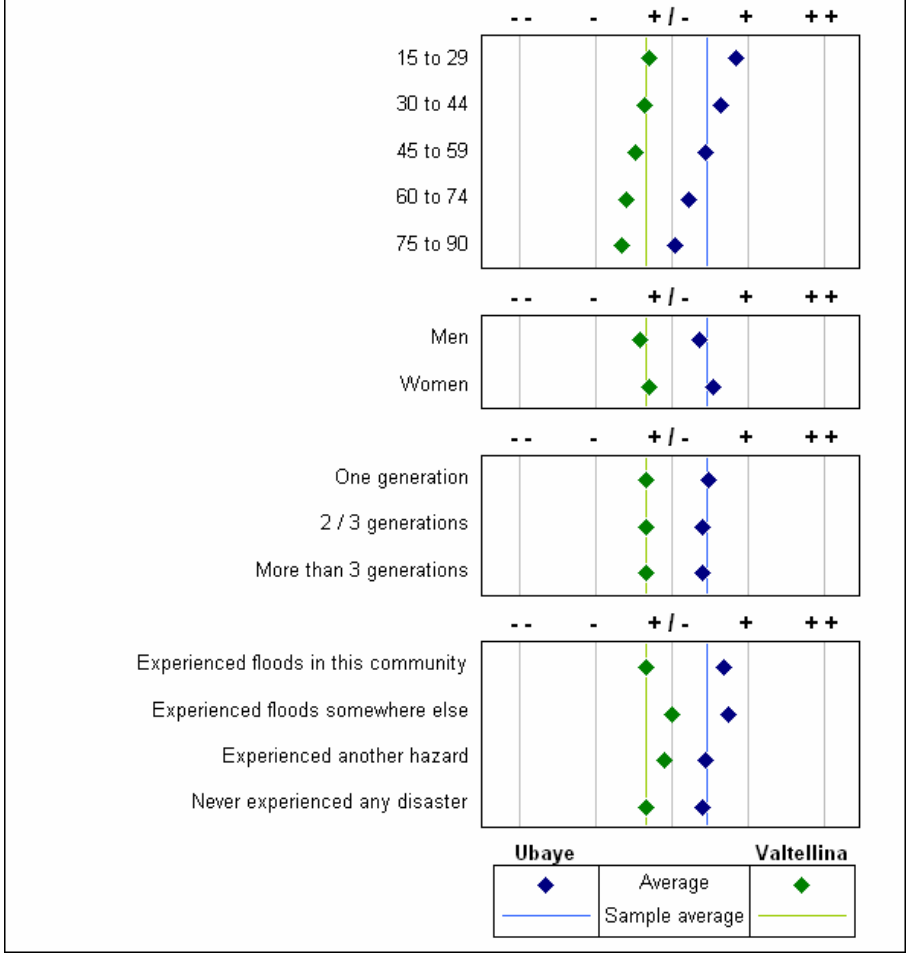
Please rate the likelihood of this statement:
"Floods occurring in my community could affect my house"



Please rate the likelihood of this statement:
"Floods occurring in my community could affect transport networks"

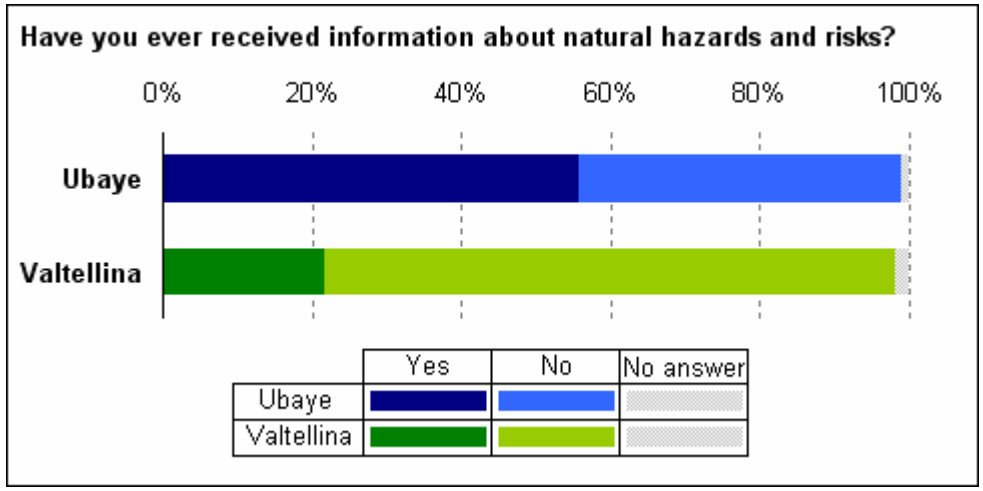


Please rate the likelihood of this statement:
"Floods occurring in my community could affect critical lifelines"



Question: Have you ever received information about natural hazards?

	Ubaye		Valtellina	
Yes	192	56%	105	22%
No	148	43%	369	76%
No answer	4	1%	9	2%
Total	344	100%	483	100%



Crossing this question with age

		Yes	No	No answer	Total	Yes	No	No answer	Total
		Ubaye				Valtellina			
Age groups	Sample	56%	43%	1%	100%	22%	76%	2%	100%
	15 to 29	47%	53%	0%	100%	28%	70%	1%	100%
	30 to 44	39%	61%	0%	100%	10%	90%	0%	100%
	45 to 59	61%	38%	1%	100%	13%	85%	2%	100%
	60 to 74	64%	34%	2%	100%	0%	83%	17%	100%
	75 to 89	73%	23%	3%	100%	17%	83%	0%	100%
	90 and +	0%	100%	0%	100%	-	-	-	-

Crossing this question with gender by the use of indices

	Yes	No	No answer	Total	Yes	No	No answer	Total
	Ubaye				Valtellina			
Sample	56%	43%	1%	100%	22%	76%	2%	100%
Men	63%	36%	2%	100%	26%	71%	2%	100%
Women	48%	51%	1%	100%	18%	80%	1%	100%

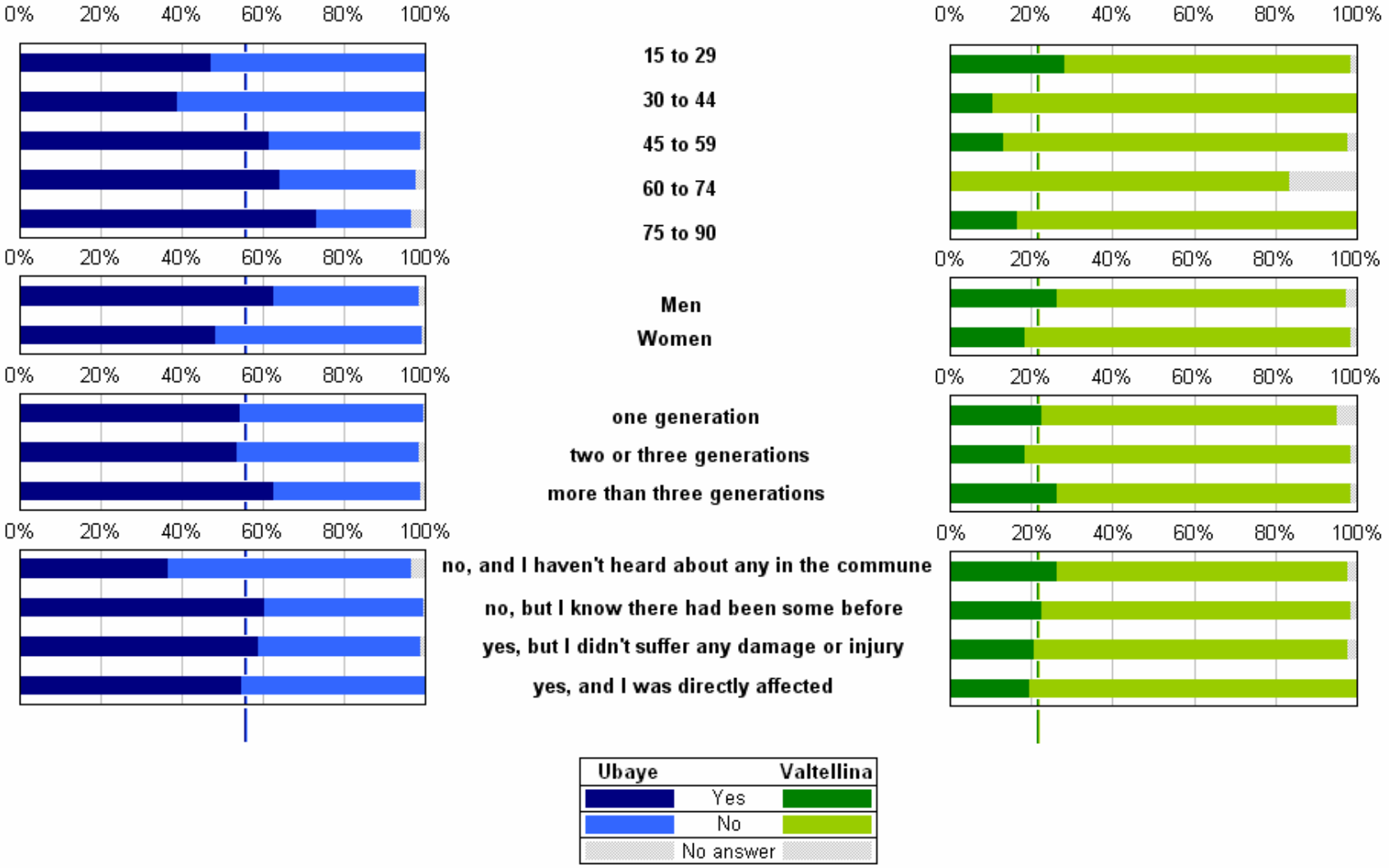
Crossing this question with ancientness in the valley (in generations) by the use of indices

		Yes	No	No answer	Total	Yes	No	No answer	Total
		Ubaye				Valtellina			
Ancientness	Sample	56%	43%	1%	100%	22%	76%	2%	100%
	One generation	54%	45%	1%	100%	23%	73%	5%	100%
	Two or three generations	54%	45%	1%	100%	18%	80%	1%	100%
	More than three generations	63%	36%	1%	100%	26%	72%	1%	100%

Crossing this question with former experiences with natural disasters by the use of indices

		Yes	No	No answer	Total	Yes	No	No answer	Total
		Ubaye				Valtellina			
Age groups	Sample	56%	43%	1%	100%	22%	76%	2%	100%
	No, and I haven't heard about any in the commune	37%	60%	3%	100%	26%	71%	2%	100%
	No, but I know there had been some before	60%	39%	1%	100%	23%	76%	2%	100%
	Yes, but I didn't suffer any damage or injury	59%	40%	1%	100%	21%	77%	2%	100%
	Yes, and I was directly affected	55%	45%	0%	100%	19%	81%	0%	100%

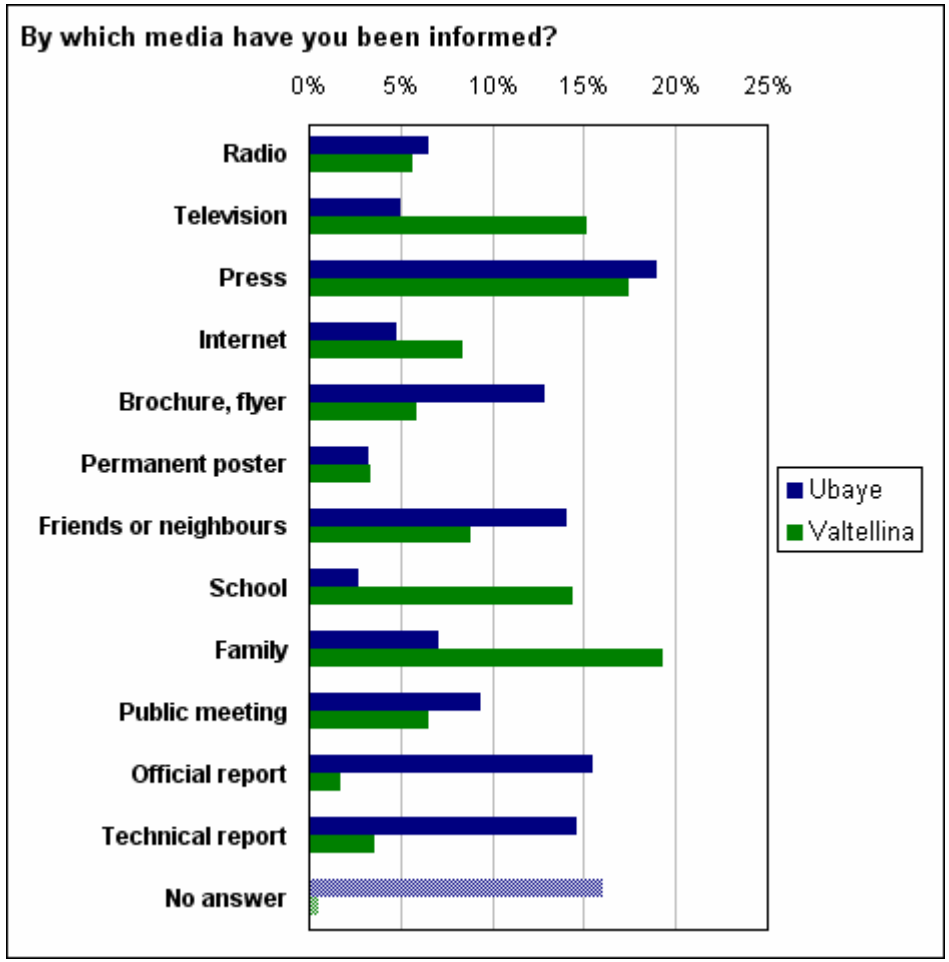
Have you ever received information about natural hazards and risks?



Question: By which media have you already been informed about natural hazards (several answers possible)?

Media of past information	Ubaye		Valtellina	
Radio	22	6%	27	5,6%
Television	17	5%	73	15,1%
Press	65	19%	84	17,4%
Internet	16	5%	40	8,3%
Brochure, flyer	44	13%	28	5,8%
Permanent poster	11	3%	16	3,3%
Friends or neighbours	48	14%	42	8,7%
School	9	3%	69	14,3%
Family	24	7%	93	19,3%
Public meeting	32	9%	31	6,4%
Official report	53	15%	8	1,7%
Technical report	50	15%	17	3,5%
No answer	55	16%	2	0,4%
Total	344	100%	483	100%

(Other answers for Ubaye: townhall 80, collective memory 8, real estate 2, professional or leisure activity 3)


By which media have you been informed?
0%
5%
10%
15%
20%
25%
Radio
Television
Press
Internet
Brochure, flyer
Permanent poster
Friends or neighbours
School
Family
Public meeting
Official report
Technical report
No answer
Ubaye
Valtellina

Crossing this question with age

		Radio	Television	Press	Internet	Brochure, flyer	Permanent posters	Friends or neighbours	School	Family	Public meeting	Official report	Technical report	No answer
	Ubaye													
Age group	**Sample**	6%	5%	19%	5%	13%	3%	14%	3%	7%	9%	15%	15%	16%
	15 to 29	17%	6%	17%	8%	11%	3%	19%	8%	11%	3%	11%	14%	19%
	30 to 44	5%	5%	12%	5%	13%	2%	9%	4%	5%	7%	14%	8%	22%
	45 to 59	5%	5%	25%	5%	10%	3%	18%	2%	8%	6%	17%	15%	16%
	60 to 74	7%	5%	21%	4%	15%	5%	15%	1%	5%	14%	17%	21%	12%
	75 to 89	0%	3%	17%	0%	17%	0%	7%	0%	10%	20%	17%	13%	10%
	90 and +	-	-	-	-	-	-	-	-	-	-	-	-	-
	Valtellina													
Age group	**Sample**	6%	15%	17%	8%	6%	3%	9%	14%	19%	6%	2%	4%	0,4%
	15 to 29	6%	17%	17%	9%	7%	3%	9%	20%	25%	6%	1%	4%	0,7%
	30 to 44	9%	19%	22%	10%	4%	6%	13%	6%	10%	4%	4%	3%	0%
	45 to 59	3%	10%	18%	5%	2%	2%	5%	3%	12%	10%	3%	4%	0%
	60 to 74	6%	0%	6%	0%	6%	6%	6%	6%	0%	0%	0%	0%	0%
	75 to 89	0%	0%	0%	0%	0%	0%	0%	0%	0%	17%	0%	0%	0%
	90 and +	-	-	-	-	-	-	-	-	-	-	-	-	-

Crossing this question with gender

	Radio	Television	Press	Internet	Brochure, flyer	Permanent posters	Friends or neighbours	School	Family	Public meeting	Official report	Technical report	No answer
Ubaye													
Sample	6%	5%	19%	5%	13%	3%	14%	3%	7%	9%	15%	15%	16%
Men	5%	4%	19%	5%	15%	3%	13%	2%	5%	14%	21%	18%	15%
Women	8%	6%	19%	4%	11%	3%	15%	4%	9%	4%	9%	10%	18%
Valtellina													
Sample	6%	15%	17%	8%	6%	3%	9%	14%	19%	6%	2%	4%	0,4%
Men	3%	14%	17%	10%	6%	3%	8%	12%	19%	7%	3%	4%	0,5%
Women	7%	16%	18%	7%	6%	3%	9%	16%	20%	6%	1%	3%	0,4%

Crossing this question with ancientness in the valley (in generations)

Ancientness	Radio	Television	Press	Internet	Brochure, flyer	Permanent posters	Friends or neighbours	School	Family	Public meeting	Official report	Technical report	No answer
Ubaye													
Sample	6%	5%	19%	5%	13%	3%	14%	3%	7%	9%	15%	15%	16%
One generation	5%	4%	16%	5%	11%	3%	15%	2%	3%	9%	17%	15%	20%
Two or three generations	6%	6%	23%	6%	15%	6%	21%	3%	10%	11%	17%	20%	14%
More than three generations	10%	6%	22%	3%	14%	1%	5%	5%	15%	8%	10%	10%	8%
Valtellina													
Sample	6%	15%	17%	8%	6%	3%	9%	14%	19%	6%	2%	4%	0,4%
One generation	13%	16%	19%	5%	13%	3%	11%	24%	19%	6%	2%	3%	0%
Two or three generations	5%	18%	18%	10%	3%	4%	9%	12%	20%	4%	1%	3%	0%
More than three generations	4%	13%	17%	8%	5%	3%	8%	14%	21%	8%	2%	4%	1%

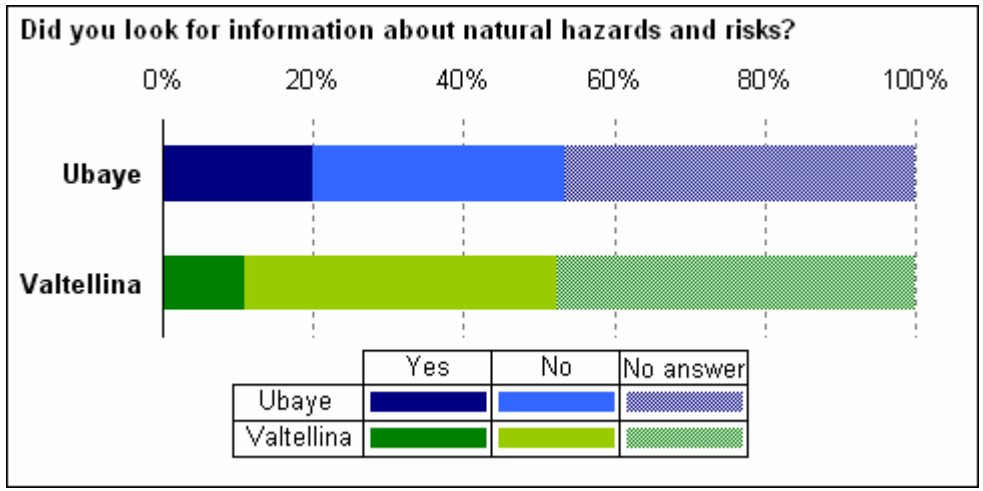
Crossing this question with former experiences with natural disasters

		Radio	Television	Press	Internet	Brochure, flyer	Permanent posters	Friends or neighbours	School	Family	Public meeting	Official report	Technical report	No answer
	Ubaye													
Age group	**Sample**	6%	5%	19%	5%	13%	3%	14%	3%	7%	9%	15%	15%	16%
	No, and I haven't heard about any in the commune	2%	5%	12%	2%	7%	0%	10%	0%	2%	5%	7%	3%	17%
	No, but I know there had been some before	6%	5%	22%	4%	15%	4%	15%	3%	9%	10%	18%	19%	13%
	Yes, but I didn't suffer any damage or injury	11%	6%	19%	9%	13%	4%	18%	4%	5%	11%	16%	14%	24%
	Yes, and I was directly affected	0%	0%	9%	0%	9%	0%	0%	0%	18%	9%	9%	9%	0%
	Valtellina													
Age group	**Sample**	6%	15%	17%	8%	6%	3%	9%	14%	19%	6%	2%	4%	0,4%
	No, and I haven't heard about any in the commune	7%	17%	17%	17%	7%	5%	5%	26%	14%	7%	0%	2%	0%
	No, but I know there had been some before	5%	14%	17%	9%	7%	3%	9%	19%	25%	5%	1%	5%	0%
	Yes, but I didn't suffer any damage or injury	7%	16%	18%	7%	5%	3%	10%	8%	16%	8%	3%	2%	0,5%
	Yes, and I was directly affected	0%	17%	19%	6%	3%	0%	6%	11%	19%	3%	3%	3%	3%

Question: Did you look for information about natural hazards?

	Ubaye		Valtellina	
Yes	69	20%	53	11%
No	115	33%	200	41%
No answer	160*	47%	230*	48%
Total	344	100%	483	100%

In Ubaye, the question was asked only to people who said they had received information about natural hazards. In Valtellina it was asked to everybody independently of their answers to previous questions.



Crossing this question with age

		Yes	No	No answer	Total	Yes	No	No answer	Total
		Ubaye				Valtellina			
Age groups	Sample	20%	33%	47%	100%	11,0%	41,4%	47,6%	100%
	15 to 29	22%	25%	53%	100%	11,3%	47,5%	41,2%	100%
	30 to 44	14%	24%	62%	100%	13,4%	37,3%	49,3%	100%
	45 to 59	21%	39%	41%	100%	9,9%	33,0%	57,1%	100%
	60 to 74	26%	38%	36%	100%	0%	11,1%	88,9%	100%
	75 to 89	13%	43%	43%	100%	16,7%	0%	83,3%	100%
	90 and +	0%	0%	100%	100%	-	-	-	-

Crossing this question with gender by the use of indices

	Yes	No	No answer	Total	Yes	No	No answer	Total
	Ubaye				Valtellina			
Sample	20%	33%	47%	100%	11%	41%	48%	100%
Men	24%	36%	40%	100%	12%	44%	44%	100%
Women	15%	31%	54%	100%	10%	39%	50%	100%

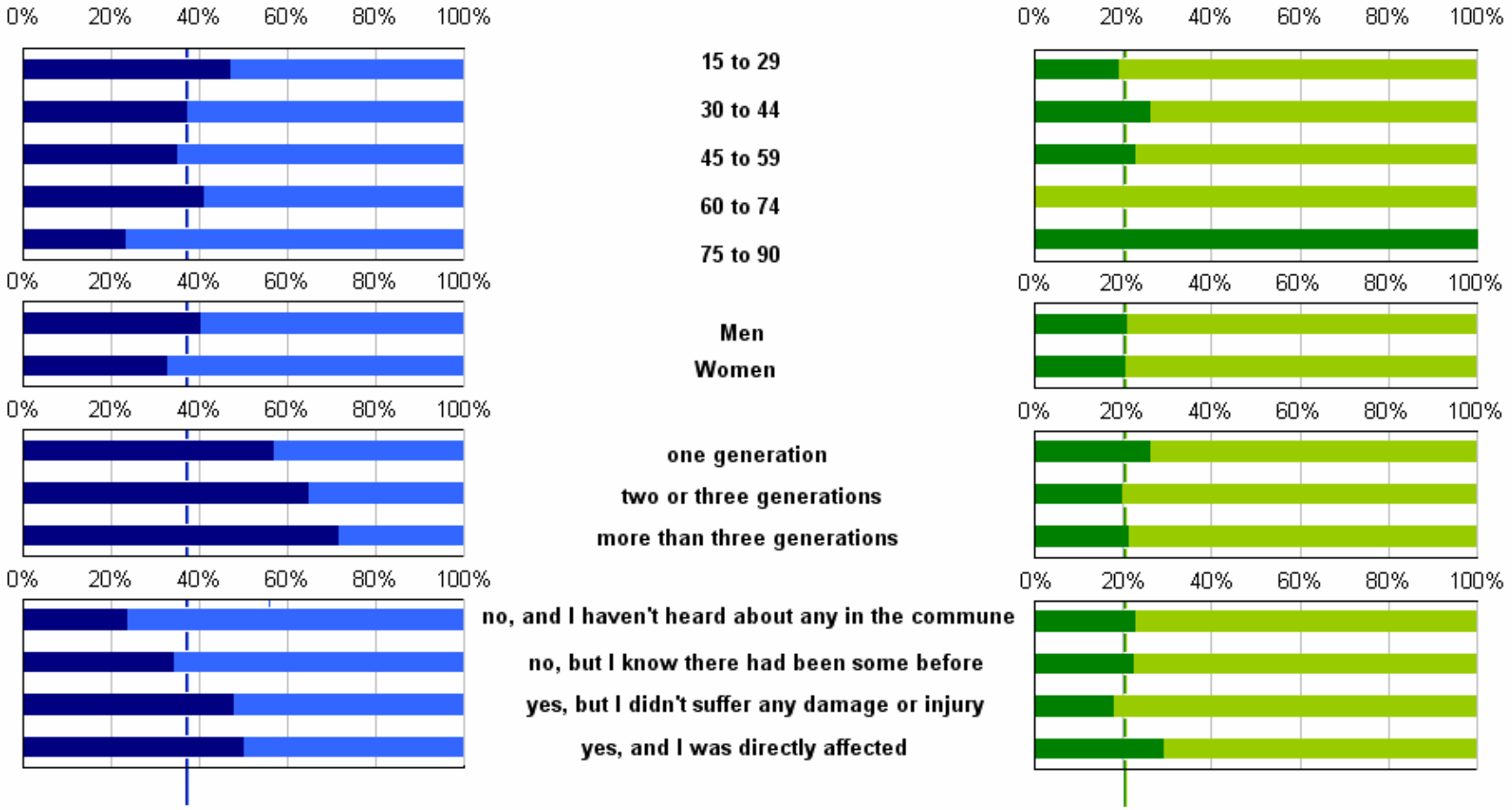
Crossing this question with ancientness in the valley (in generations) by the use of indices

		Yes	No	No answer	Total	Yes	No	No answer	Total
		Ubaye				Valtellina			
Ancientness	Sample	20%	33%	47%	100%	11%	41%	48%	100%
	One generation	30%	23%	48%	100%	15%	40%	45%	100%
	Two or three generations	34%	18%	48%	100%	11%	44%	45%	100%
	More than three generations	42%	16%	42%	100%	11%	40%	50%	100%

Crossing this question with former experiences with natural disasters by the use of indices

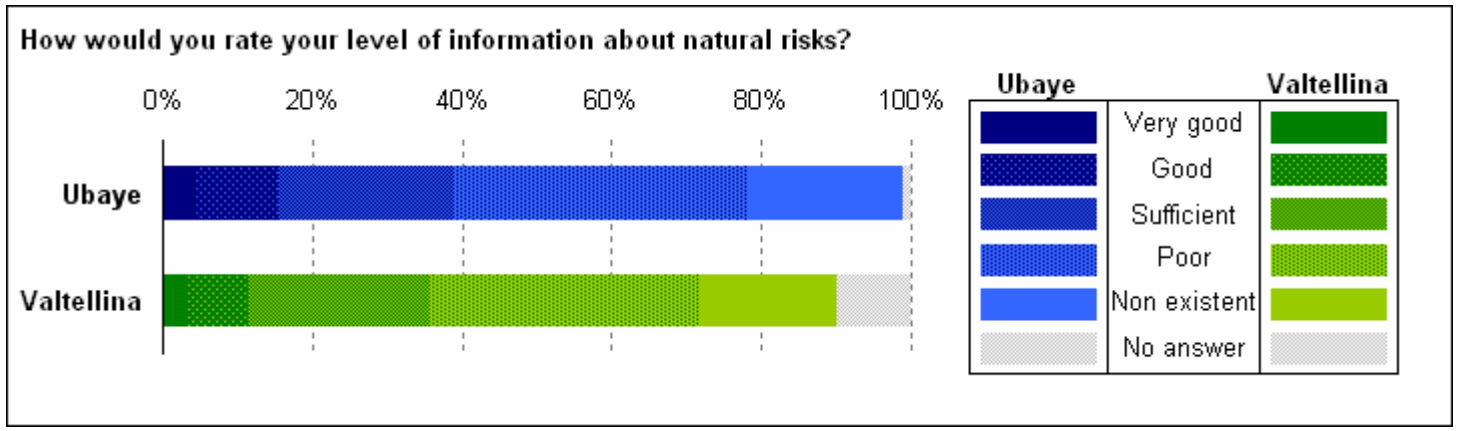
		Ubaye				Valtellina			
		Yes	No	No answer	Total	Yes	No	No answer	Total
Age groups	Sample	20%	33%	47%	100%	11%	41%	48%	100%
	No, and I haven't heard about any in the commune	8%	27%	65%	100%	14%	48%	38%	100%
	No, but I know there had been some before	20%	38%	42%	100%	12%	39%	49%	100%
	Yes, but I didn't suffer any damage or injury	28%	30%	43%	100%	9%	44%	47%	100%
	Yes, and I was directly affected	27%	27%	45%	100%	14%	33%	53%	100%

Did you look for information about natural hazards and risks?



Question: How would you rate your level of information about natural risks?

Concern about natural risks			Ubaye		Valtellina	
	++	Very good	15	4%	16	3%
	+	Good	38	11%	40	8%
	+/-	Sufficient	80	23%	117	24%
	-	Poor	136	40%	175	36%
	--	Non existent	71	21%	87	18%
	#	No answer	4	1%	48	10%
		Total	344	100%	483	100%



Crossing this question with age by the use of indices

		Level of information	
		Ubaye	Valtellina
Age group	Sample	2,38	2,36
	15 to 29	2,19	2,33
	30 to 44	2,19	2,39
	45 to 59	2,36	2,49
	60 to 74	2,52	2,50
	75 to 89	2,86	2,00
	90 and +	1,50	

Crossing this question with gender by the use of indices

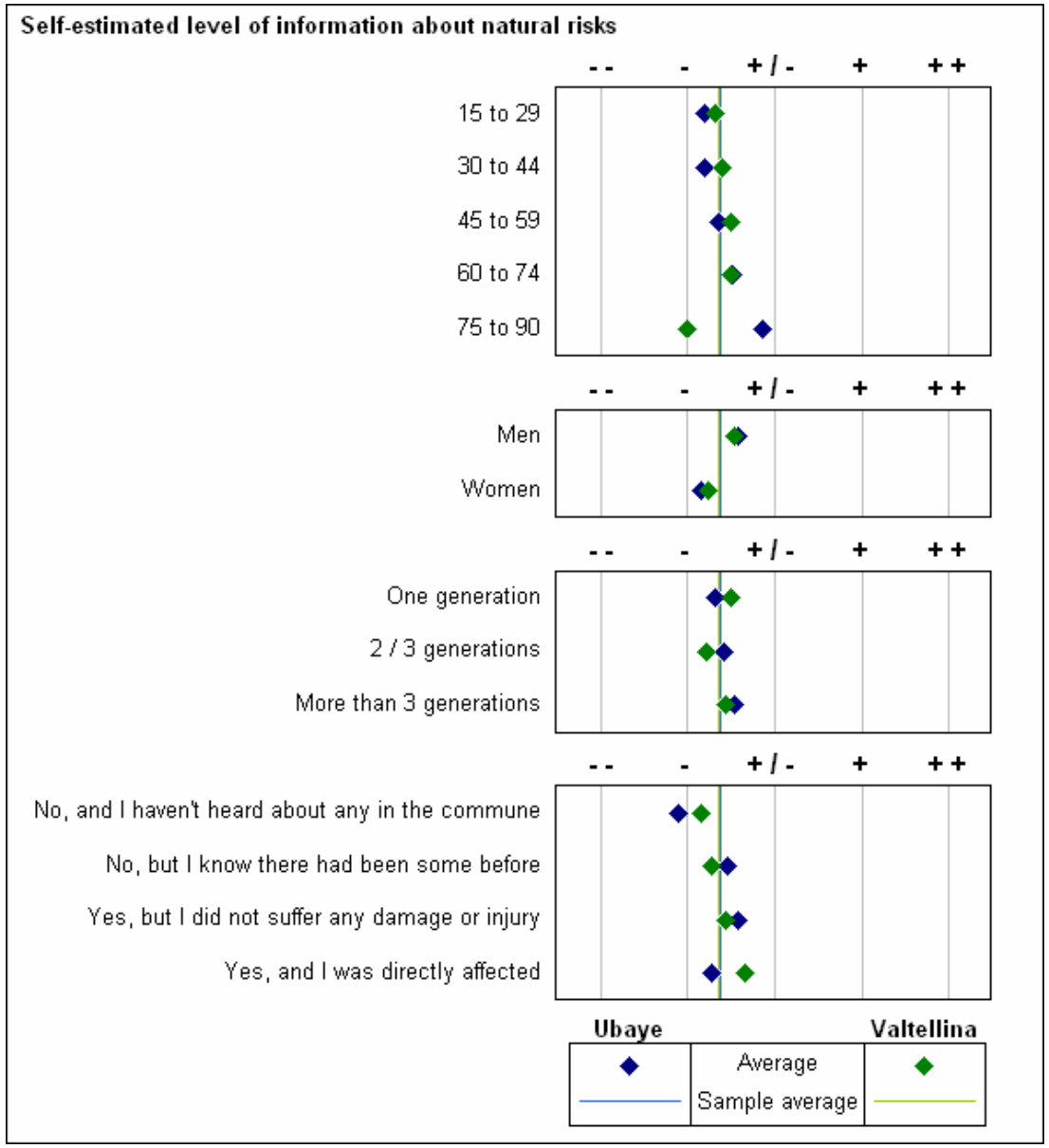
		Level of information	
		Ubaye	Valtellina
Gender	Sample	2,38	2,36
	Men	2,57	2,54
	Women	2,16	2,23

Crossing this question with ancientness in the valley (in generations) by the use of indices

		Level of information	
		Ubaye	Valtellina
Ancientness (generations)	Sample	2,38	2,36
	One	2,32	2,50
	Two or three	2,42	2,22
	More than three	2,53	2,44

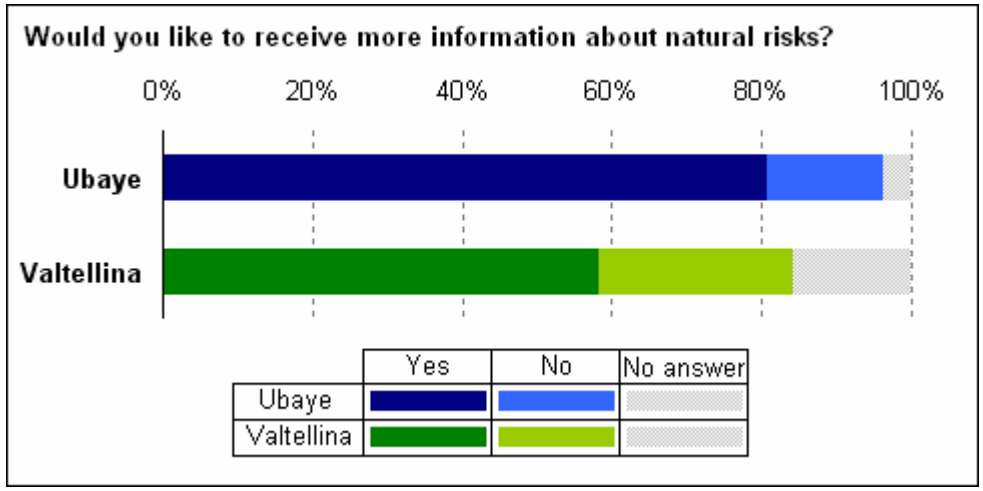
Crossing this question with former experience with natural disasters by the use of indices

		Level of information	
		Ubaye	**Valtellina**
Experience with disaster	**Sample**	2,38	2,36
	No, and I haven't heard about any in the commune	1,90	2,16
	No, but I know there had been some before	2,45	2,28
	Yes, but I didn't suffer any damage or injury	2,58	2,43
	Yes, and I was directly affected	2,27	2,66


Self-estimated level of information about natural risks
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average

Question: Would you like to receive more information about natural hazards?

	Ubaye		Valtellina	
Yes	278	81%	281	58%
No	53	15%	126	26%
No answer	13	4%	76	16%
Total	344	100%	483	100%



Crossing this question with age

		Yes	No	No answer	Total	Yes	No	No answer	Total
		Ubaye				Valtellina			
Age groups	Sample	81%	15%	4%	100%	58%	26%	16%	100%
	15 to 29	89%	11%	0%	100%	55%	33%	13%	100%
	30 to 44	87%	13%	0%	100%	63%	15%	22%	100%
	45 to 59	83%	14%	3%	100%	72%	20%	9%	100%
	60 to 74	75%	17%	8%	100%	72%	6%	22%	100%
	75 to 89	63%	30%	7%	100%	50%	17%	33%	100%
	90 and +	100%	0%	0%	100%	-	-	-	-

Crossing this question with gender by the use of indices

	Yes	No	No answer	Total	Yes	No	No answer	Total
	Ubaye				Valtellina			
Sample	81%	15%	4%	100%	58%	26%	16%	100%
Men	78%	20%	2%	100%	54%	30%	15%	100%
Women	84%	11%	6%	100%	61%	23%	16%	100%

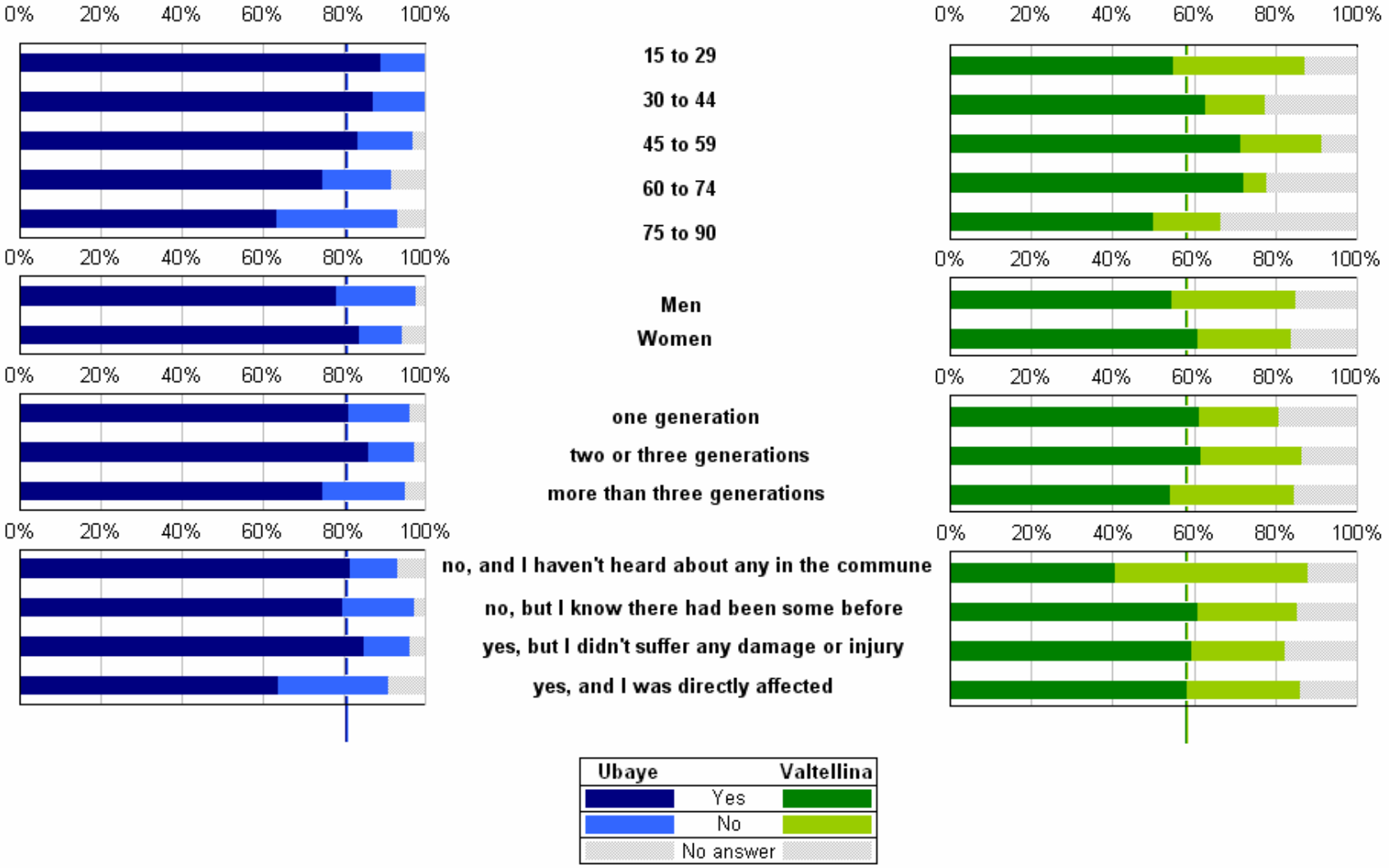
Crossing this question with ancientness in the valley (in generations) by the use of indices

		Yes	No	No answer	Total	Yes	No	No answer	Total
		Ubaye				Valtellina			
Ancientness	Sample	81%	15%	4%	100%	58%	26%	16%	100%
	One generation	81%	15%	4%	100%	61%	19%	19%	100%
	Two or three generations	86%	11%	3%	100%	61%	25%	14%	100%
	More than three generations	75%	20%	5%	100%	54%	30%	16%	100%

Crossing this question with former experiences with natural disasters by the use of indices

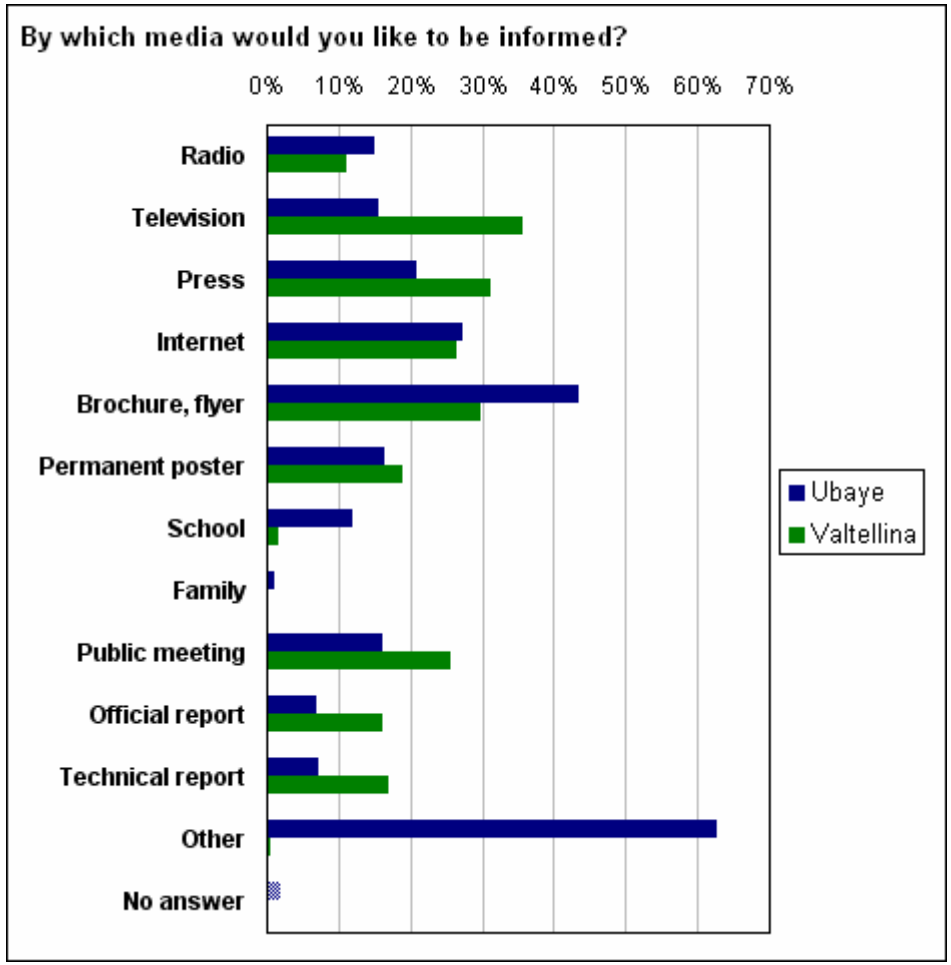
		Ubaye				Valtellina			
		Yes	No	No answer	Total	Yes	No	No answer	Total
	Sample	81%	15%	4%	100%	58%	26%	16%	100%
Age groups	**No, and I haven't heard about any in the commune**	82%	12%	7%	100%	40%	48%	12%	100%
	No, but I know there had been some before	80%	18%	3%	100%	61%	24%	15%	100%
	Yes, but I didn't suffer any damage or injury	85%	11%	4%	100%	59%	23%	18%	100%
	Yes, and I was directly affected	64%	27%	9%	100%	58%	26%	16%	100%

Would you like to receive more information about natural risks?



Question: By which media would you like to receive information about natural hazards (several answers possible)?

Media of past information	Ubaye		Valtellina	
Radio	51	15%	52	10,8%
Television	53	15%	171	35,4%
Press	71	21%	149	30,8%
Internet	93	27%	126	26,1%
Brochure, flyer	149	43%	143	29,6%
Permanent poster	56	16%	90	18,6%
School	40	12%	7	1,4%
Family	3	1%	-	-
Public meeting	55	16%	123	25,5%
Official report	23	7%	77	15,9%
Technical report	24	7%	81	16,8%
Other	215	63%	2	0,4%
No answer	6	2%	0	0,0%
Total	344	100%	483	100%


By which media would you like to be informed?
0%
10%
20%
30%
40%
50%
60%
70%
Radio
Television
Press
Internet
Brochure, flyer
Permanent poster
School
Family
Public meeting
Official report
Technical report
Other
No answer
Ubaye
Valtellina

Crossing this question with age

		Radio	Television	Press	Internet	Brochure, flyer	Permanent posters	School	Family	Public meeting	Official report	Technical report	Other	No answer
	Ubaye													
Age group	**Sample**	15%	15%	21%	27%	43%	16%	12%	1%	16%	7%	7%	63%	2%
	15 to 29	22%	22%	22%	33%	67%	36%	17%	3%	11%	8%	3%	56%	0%
	30 to 44	11%	13%	22%	32%	51%	14%	19%	1%	13%	4%	6%	61%	0%
	45 to 59	17%	11%	27%	22%	48%	19%	14%	1%	25%	6%	9%	64%	2%
	60 to 74	14%	17%	14%	34%	31%	11%	4%	0%	12%	6%	7%	68%	3%
	75 to 89	17%	20%	17%	3%	20%	7%	3%	0%	17%	17%	7%	57%	3%
	90 and +	0%	100%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	0%
	Valtellina													
Age group	**Sample**	11%	35%	31%	26%	30%	19%	1%	-	25%	16%	17%	0%	0%
	15 to 29	12%	44%	34%	32%	27%	19%	2%	-	21%	14%	12%	1%	0%
	30 to 44	12%	25%	39%	28%	42%	27%	0%	-	21%	21%	19%	0%	0%
	45 to 59	2%	19%	20%	13%	32%	8%	0%	-	37%	20%	30%	0%	0%
	60 to 74	22%	22%	17%	0%	28%	33%	0%	-	56%	17%	28%	0%	0%
	75 to 89	17%	17%	0%	0%	0%	33%	0%	-	17%	0%	17%	0%	0%
	90 and +	-	-	-	-	-	-	-	-	-	-	-	-	-

Crossing this question with gender

	Radio	Television	Press	Internet	Brochure, flyer	Permanent posters	School	Family	Public meeting	Official report	Technical report	Other	No answer
Ubaye													
Sample	15%	15%	21%	27%	43%	16%	12%	1%	16%	7%	7%	63%	2%
Men	15%	17%	23%	30%	36%	13%	9%	2%	14%	9%	9%	63%	2%
Women	14%	13%	18%	24%	51%	19%	14%	0%	18%	4%	4%	63%	2%
Valtellina													
Sample	11%	35%	31%	26%	30%	19%	1%	-	25%	16%	17%	0%	0%
Men	9%	33%	30%	32%	22%	17%	2%	-	21%	18%	18%	0%	0%
Women	12%	37%	32%	22%	35%	20%	1%	-	29%	14%	16%	0%	0%

Crossing this question with ancientness in the valley (in generations)

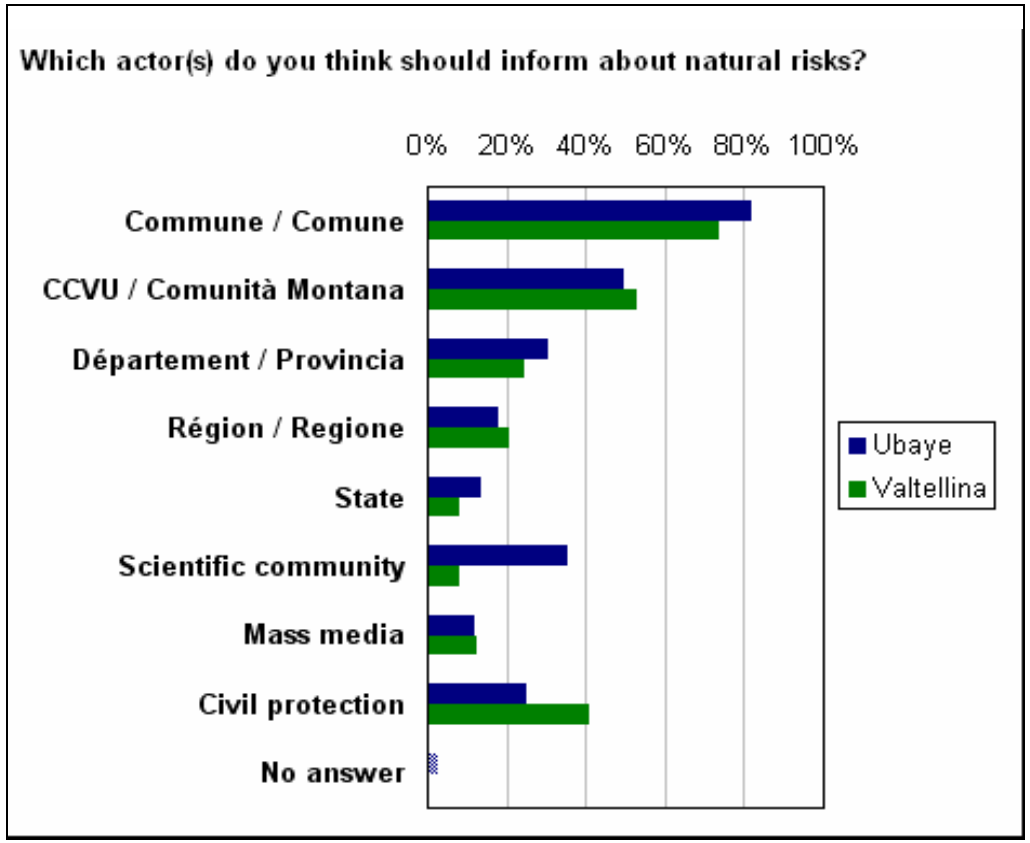
Ancientness	Radio	Television	Press	Internet	Brochure, flyer	Permanent posters	School	Family	Public meeting	Official report	Technical report	Other	No answer
Ubaye													
Sample	15%	15%	21%	27%	43%	16%	12%	1%	16%	7%	7%	63%	2%
One generation	14%	16%	16%	33%	45%	16%	12%	1%	17%	5%	8%	60%	2%
Two or three generations	21%	17%	30%	25%	44%	18%	14%	3%	15%	10%	10%	66%	0%
More than three generations	10%	13%	22%	15%	39%	14%	8%	0%	14%	8%	1%	66%	4%
Valtellina													
Sample	11%	35%	31%	26%	30%	19%	1%	-	25%	16%	17%	0,4%	0%
One generation	11%	29%	24%	27%	37%	8%	0%	-	26%	16%	21%	0%	0%
Two or three generations	9%	33%	30%	28%	33%	22%	2%	-	22%	17%	18%	0%	0%
More than three generations	11%	41%	36%	27%	25%	19%	1%	-	26%	16%	16%	0,5%	0%

Crossing this question with former experiences with natural disasters

Age group	Radio	Television	Press	Internet	Brochure, flyer	Permanent posters	School	Family	Public meeting	Official report	Technical report	Other	No answer
Ubaye													
Sample	15%	15%	21%	27%	43%	16%	12%	1%	16%	7%	7%	63%	2%
No, and I haven't heard about any in the commune	15%	12%	12%	25%	45%	8%	15%	0%	7%	5%	8%	58%	3%
No, but I know there had been some before	16%	13%	24%	28%	44%	18%	10%	1%	18%	8%	6%	65%	1%
Yes, but I didn't suffer any damage or injury	16%	24%	25%	25%	44%	20%	14%	3%	19%	5%	8%	63%	1%
Yes, and I was directly affected	0%	9%	0%	36%	27%	9%	9%	0%	9%	0%	0%	55%	0%
Valtellina													
Sample	11%	35%	31%	26%	30%	19%	1%	0%	25%	16%	17%	0,4%	0%
No, and I haven't heard about any in the commune	14%	38%	26%	24%	31%	21%	5%	0%	26%	7%	17%	0%	0%
No, but I know there had been some before	9%	38%	27%	30%	29%	21%	1%	0%	17%	15%	15%	1%	0%
Yes, but I didn't suffer any damage or injury	11%	33%	34%	22%	28%	16%	1%	0%	33%	18%	18%	0%	0%
Yes, and I was directly affected	6%	39%	44%	33%	33%	19%	0%	0%	25%	17%	19%	3%	0%

Question: Which actor should inform populations about natural hazards and risks (several answers possible)?

Relevant actor to inform	Ubaye		Valtellina	
Commune / Comune	280	81%	353	73%
CCVU / CM Tirano	169	49%	254	53%
Département / Provincia	104	30%	116	24%
Région / Regione	61	18%	97	20%
State	46	13%	37	8%
Scientific community	120	35%	37	8%
Mass media	40	12%	57	12%
Civil protection	84	24%	195	40%
No answer	7	2%	1	0,2%
Total	344	100%	483	100%


Which actor(s) do you think should inform about natural risks?
0%
20%
40%
60%
80%
100%
Commune / Comune
CCVU / Comunità Montana
Département / Provincia
Région / Regione
State
Scientific community
Mass media
Civil protection
No answer
Ubaye
Valtellina

Crossing this question with age

Age group	Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Scientific community	Mass media	Civil protection
	Ubaye							
Sample	81%	49%	30%	18%	13%	35%	12%	24%
15 to 29	92%	58%	28%	14%	3%	39%	19%	25%
30 to 44	76%	52%	34%	20%	19%	45%	8%	15%
45 to 59	80%	47%	30%	18%	13%	35%	13%	29%
60 to 74	83%	46%	31%	16%	14%	28%	12%	26%
75 to 89	80%	47%	20%	20%	13%	23%	10%	30%
90 and +	100%	100%	100%	100%	0%	0%	0%	0%

Age group	Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Scientific community	Mass media	Civil protection
	Valtellina							
Sample	73%	53%	24%	20%	8%	8%	12%	40%
15 to 29	69%	58%	27%	25%	10%	8%	17%	45%
30 to 44	79%	46%	25%	12%	4%	7%	7%	31%
45 to 59	77%	42%	18%	14%	3%	9%	2%	34%
60 to 74	94%	44%	6%	6%	0%	0%	0%	44%
75 to 89	100%	17%	0%	0%	0%	0%	0%	17%
90 and +	-	-	-	-	-	-	-	-

Crossing this question with gender

		Ubaye								Valtellina							
		Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Scientific community	Mass media	Civil protection	Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Scientific community	Mass media	Civil protection
Gender	Sample	81%	49%	30%	18%	13%	35%	12%	24%	73%	53%	24%	20%	8%	8%	12%	40%
	Men	80%	49%	33%	19%	17%	34%	14%	22%	74%	50%	25%	20%	10%	8%	14%	38%
	Women	83%	49%	28%	16%	9%	36%	9%	27%	73%	55%	24%	20%	6%	7%	10%	42%

Crossing this question with ancientness in the valley (in generations)

		Ubaye								Valtellina							
		Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Scientific community	Mass media	Civil protection	Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Scientific community	Mass media	Civil protection
Ancientness	Sample	81%	49%	30%	18%	13%	35%	12%	24%	73%	53%	24%	20%	8%	8%	12%	40%
	One generation	82%	49%	30%	19%	13%	36%	15%	26%	79%	48%	26%	23%	8%	5%	10%	44%
	Two or three generations	86%	56%	32%	14%	15%	30%	6%	25%	68%	58%	30%	23%	7%	12%	13%	41%
	More than three generations	76%	43%	28%	18%	14%	37%	8%	19%	75%	50%	20%	19%	8%	6%	12%	39%

Crossing this question with former experiences with natural disasters

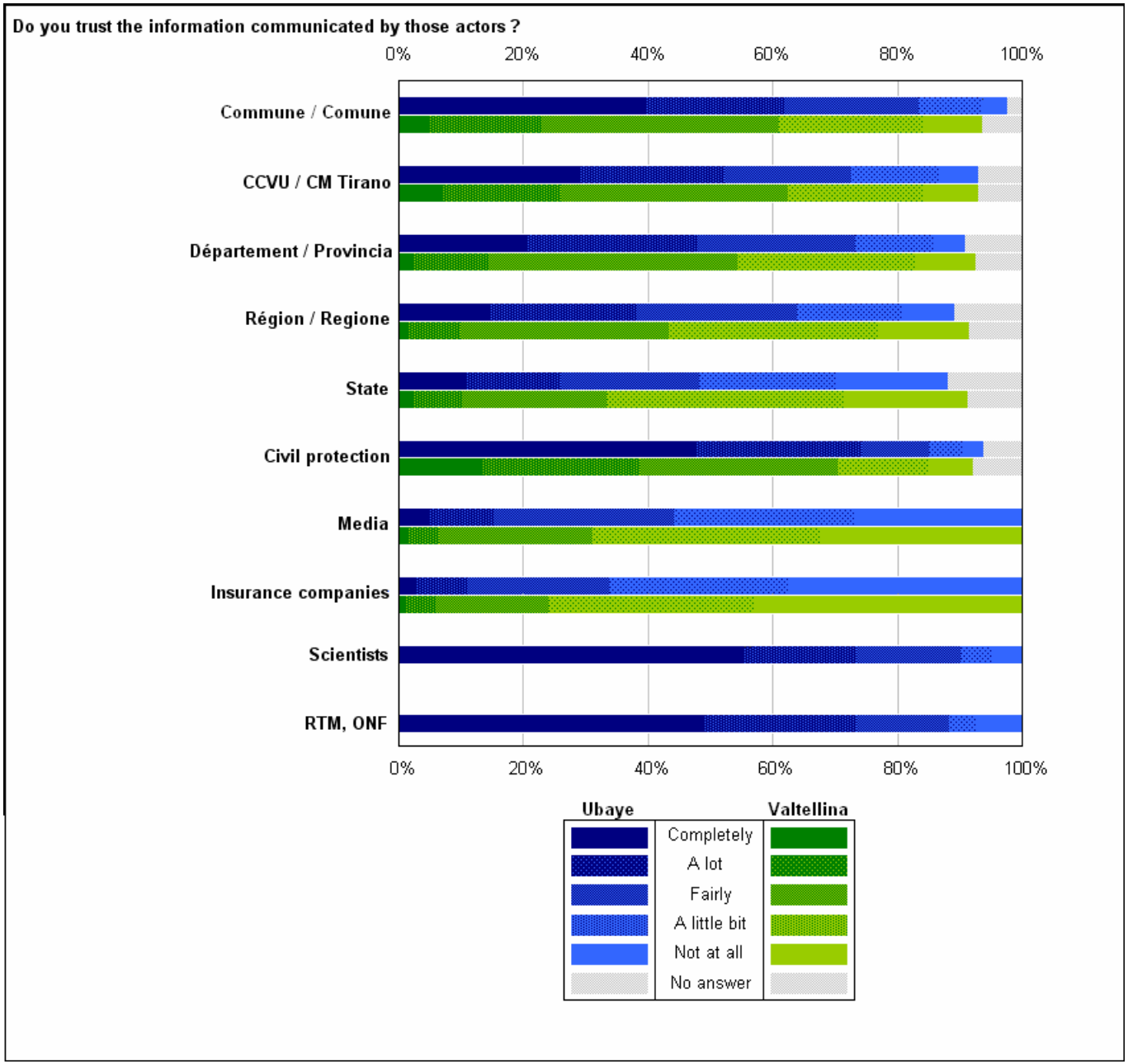
Experience with disaster	Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Scientific community	Mass media	Civil protection
	Ubaye							
Sample	81%	49%	30%	18%	13%	35%	12%	24%
No, and I haven't heard about any in the commune	87%	37%	22%	13%	12%	28%	7%	23%
No, but I know there had been some before	80%	51%	31%	16%	9%	33%	10%	26%
Yes, but I didn't suffer any damage or injury	85%	53%	38%	28%	25%	41%	20%	20%
Yes, and I was directly affected	73%	64%	27%	9%	9%	45%	18%	27%

Experience with disaster	Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Scientific community	Mass media	Civil protection
	Valtellina							
Sample	73%	53%	24%	20%	8%	8%	12%	40%
No, and I haven't heard about any in the commune	71%	45%	19%	29%	17%	12%	24%	40%
No, but I know there had been some before	70%	56%	24%	21%	9%	9%	14%	42%
Yes, but I didn't suffer any damage or injury	77%	52%	24%	18%	6%	7%	9%	41%
Yes, and I was directly affected	67%	50%	33%	19%	0%	3%	8%	28%

Question: Do you trust the information communicated by those actors?

++	Completely
+	A lot
+/-	Fairly
-	A little bit
--	Not at all
#	No answer

		Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Civil Protection	Mass media	Insurance companies	Scientists	RTM, ONF
	Ubaye										
++	**Completely**	40%	29%	20%	15%	11%	47%	4%	2%	51%	45%
+	**A lot**	22%	23%	28%	24%	15%	27%	10%	8%	17%	23%
+/-	**Fairly**	22%	20%	25%	26%	22%	11%	25%	20%	16%	14%
-	**A little bit**	10%	14%	13%	17%	22%	6%	26%	25%	5%	4%
--	**Not at all**	4%	6%	5%	8%	18%	3%	23%	33%	4%	7%
#	**No answer**	2%	7%	9%	11%	12%	6%	12%	13%	7%	8%
	Valtellina										
++	**Completely**	5%	7%	2%	1%	2%	13%	1%	1%		
+	**A lot**	18%	19%	12%	8%	8%	25%	5%	5%		
+/-	**Fairly**	38%	36%	40%	34%	23%	32%	22%	17%		
-	**A little bit**	23%	22%	29%	34%	38%	14%	33%	30%		
--	**Not at all**	9%	8%	10%	14%	20%	7%	29%	39%		
#	**No answer**	6%	7%	7%	8%	9%	8%	9%	10%		


Do you trust the information communicated by those actors ?
0%
20%
40%
60%
80%
100%
Commune / Comune
CCVU / CM Tirano
Département / Provincia
Région / Regione
State
Civil protection
Media
Insurance companies
Scientists
RTM, ONF
Ubaye
Valtellina
Completely
A lot
Fairly
A little bit
Not at all
No answer

Crossing this question with age

	Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Civil Protection	Mass media	Insurance companies	Scientists	RTM, ONF
Ubaye										
Age group **Sample**	3,85	3,59	3,50	3,22	2,77	4,17	2,38	2,11	4,15	4,03
15 to 29	3,94	3,77	3,69	3,59	2,91	4,23	2,29	2,33	4,37	4,28
30 to 44	3,78	3,47	3,46	3,20	2,90	4,28	2,09	1,92	4,29	4,10
45 to 59	3,89	3,71	3,67	3,40	2,88	4,20	2,53	2,15	4,30	4,20
60 to 74	3,78	3,50	3,36	2,93	2,52	3,97	2,56	2,17	3,88	3,82
75 to 89	4,00	3,50	3,06	2,86	2,31	4,27	2,23	2,17	3,65	3,44
90 and +	5,00	5,00	5,00	4,00	2,00	5,00	5,00	1,00	3,00	3,00
Valtellina										
Age group **Sample**	2,85	2,94	2,67	2,45	2,29	3,25	2,07	1,89		
15 to 29	2,84	3,03	2,74	2,51	2,32	3,29	2,03	1,86		
30 to 44	2,88	2,81	2,66	2,49	2,35	3,14	2,38	2,09		
45 to 59	2,76	2,74	2,52	2,32	2,30	3,17	1,99	1,85		
60 to 74	3,08	2,50	2,08	1,82	1,64	3,17	2,25	1,83		
75 to 89	4,00	3,33	2,33	1,83	1,33	4,17	1,83	1,40		
90 and +										

Crossing this question with gender

		Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Civil Protection	Mass media	Insurance companies	Scientists	RTM, ONF
		Ubaye									
Gender	**Sample**	3,85	3,59	3,50	3,22	2,77	4,17	2,38	2,11	4,15	4,03
	Men	3,83	3,50	3,43	3,11	2,70	4,02	2,30	2,01	3,95	3,89
	Women	3,88	3,70	3,59	3,36	2,85	4,34	2,49	2,23	4,39	4,22
		Valtellina									
Gender	**Sample**	2,85	2,94	2,67	2,45	2,29	3,25	2,07	1,89		
	Men	2,92	2,96	2,70	2,45	2,26	3,27	2,02	1,87		
	Women	2,81	2,92	2,64	2,44	2,30	3,24	2,10	1,90		

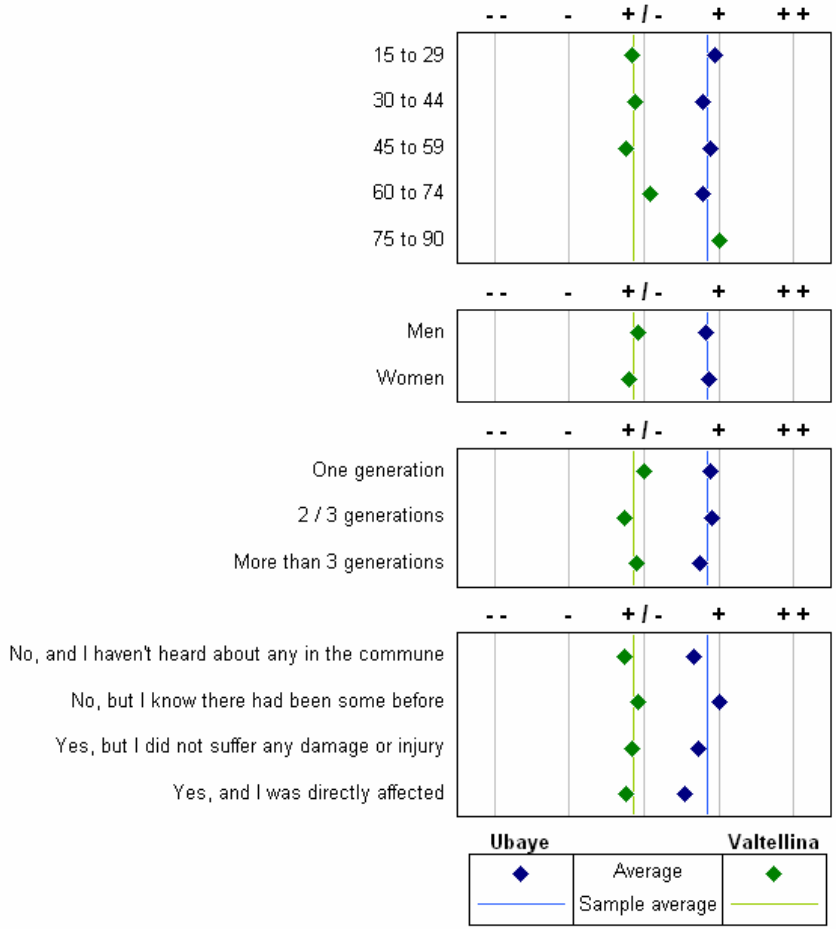
Crossing this question with ancientness in the valley (in generations)

Ancientness	Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Civil Protection	Mass media	Insurance companies	Scientists	RTM, ONF
Ubaye										
Sample	3,85	3,59	3,50	3,22	2,77	4,17	2,38	2,11	4,15	4,03
One generation	3,88	3,63	3,44	3,14	2,71	4,14	2,36	2,19	4,11	3,99
Two or three generations	3,92	3,77	3,71	3,45	2,90	4,31	2,43	1,98	4,27	4,06
More than three generations	3,75	3,34	3,51	3,22	2,77	4,07	2,44	2,06	4,13	4,11
Valtellina										
Sample	2,85	2,94	2,67	2,45	2,29	3,25	2,07	1,89		
One generation	3,00	3,12	2,72	2,40	2,23	3,21	2,23	1,96		
Two or three generations	2,74	2,91	2,73	2,55	2,32	3,23	2,09	1,77		
More than three generations	2,89	2,92	2,62	2,39	2,24	3,29	1,97	1,91		

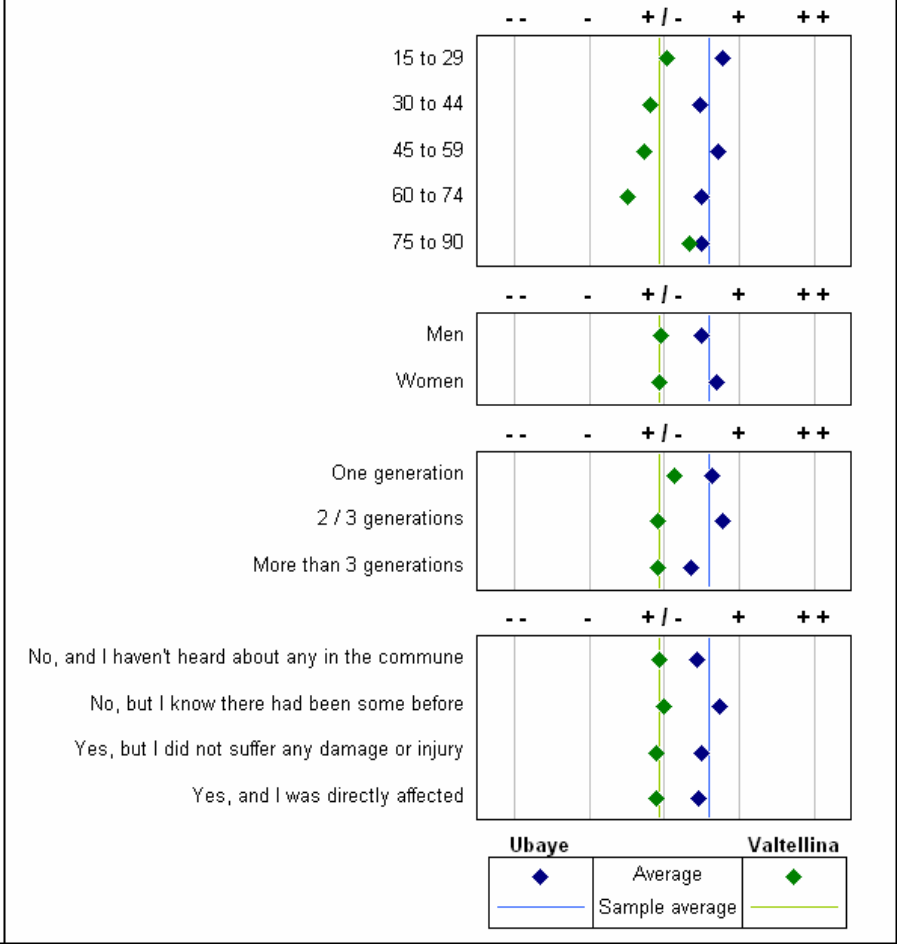
Crossing this question with former experiences with natural disasters

Experience with disaster	Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Civil Protection	Mass media	Insurance companies	Scientists	RTM, ONF
Ubaye										
Sample	3,85	3,59	3,50	3,22	2,77	4,17	2,38	2,11	4,15	4,03
No, and I haven't heard about any in the commune	3,66	3,43	3,37	3,15	2,74	4,14	2,34	2,22	4,18	4,15
No, but I know there had been some before	4,02	3,72	3,63	3,33	2,72	4,25	2,38	2,08	4,16	4,01
Yes, but I didn't suffer any damage or injury	3,72	3,49	3,42	3,08	2,92	4,09	2,35	1,97	4,16	4,07
Yes, and I was directly affected	3,55	3,45	3,36	3,18	3,00	4,09	2,82	3,00	4,00	4,09
Valtellina										
Sample	2,85	2,94	2,67	2,45	2,29	3,25	2,07	1,89		
No, and I haven't heard about any in the commune	2,73	2,93	2,93	2,76	2,64	2,98	2,46	2,37		
No, but I know there had been some before	2,92	3,00	2,74	2,55	2,31	3,40	2,01	1,77		
Yes, but I didn't suffer any damage or injury	2,84	2,90	2,59	2,34	2,26	3,18	2,08	1,93		
Yes, and I was directly affected	2,75	2,89	2,43	2,19	2,00	3,19	1,89	1,69		

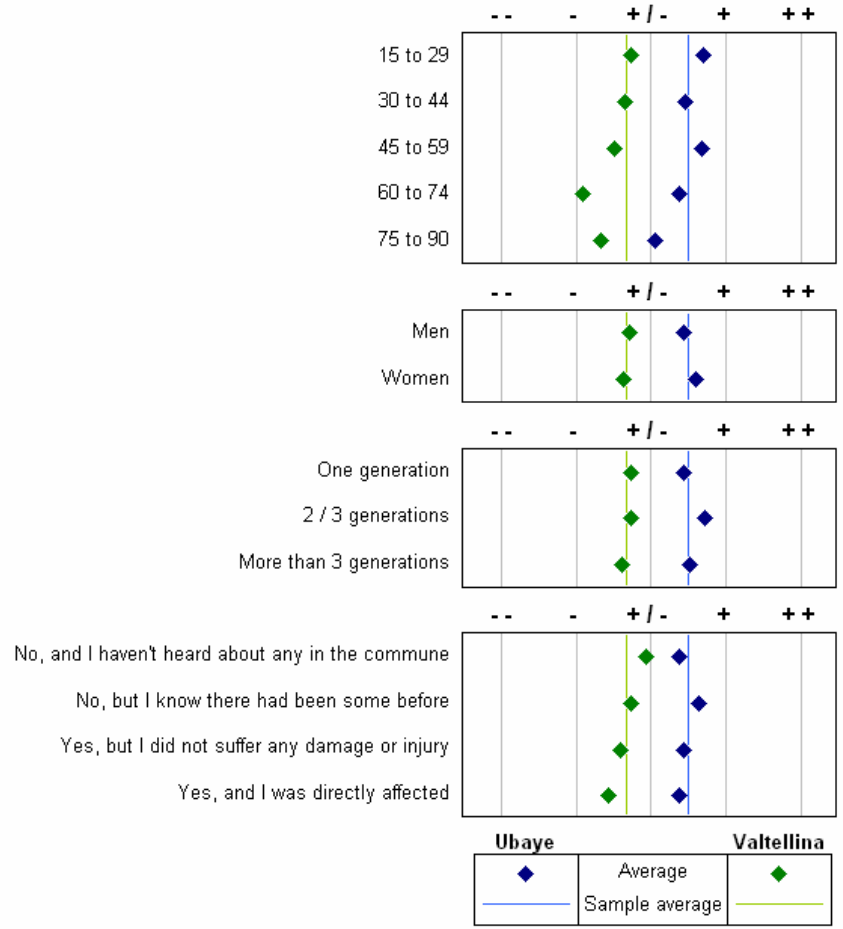
Trust in the information received from the commune / comune



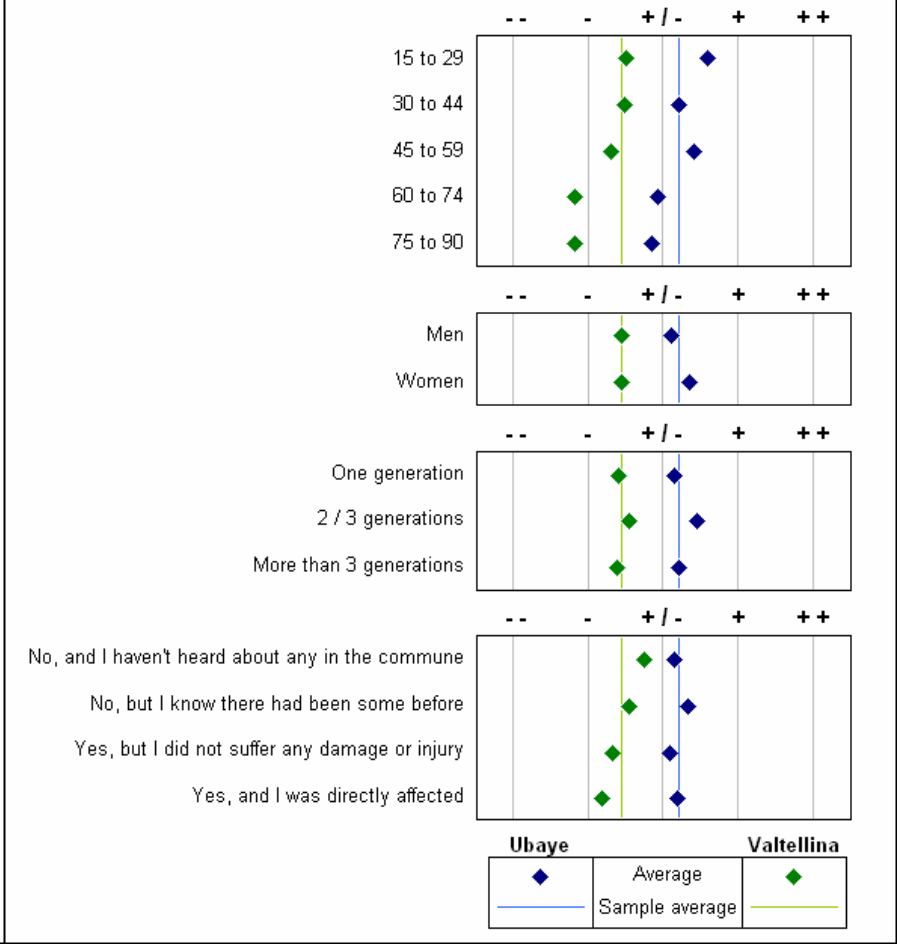
Trust in the information received from the CCVU / CMT



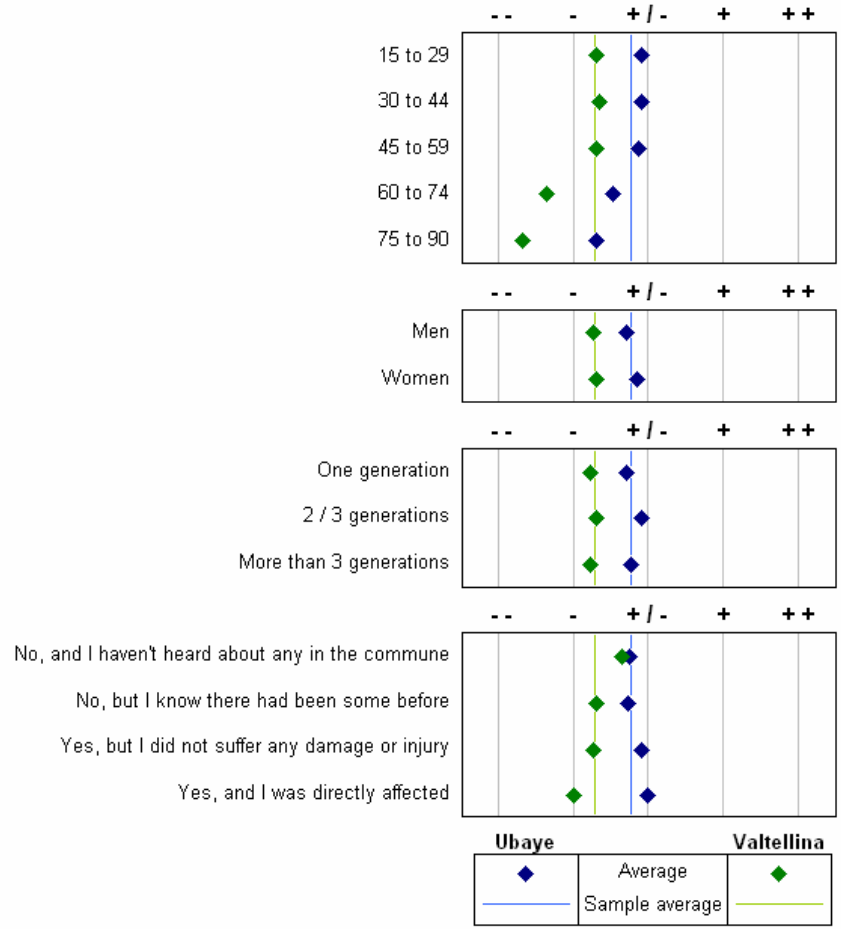
Trust in the information received from the Département / Provincia



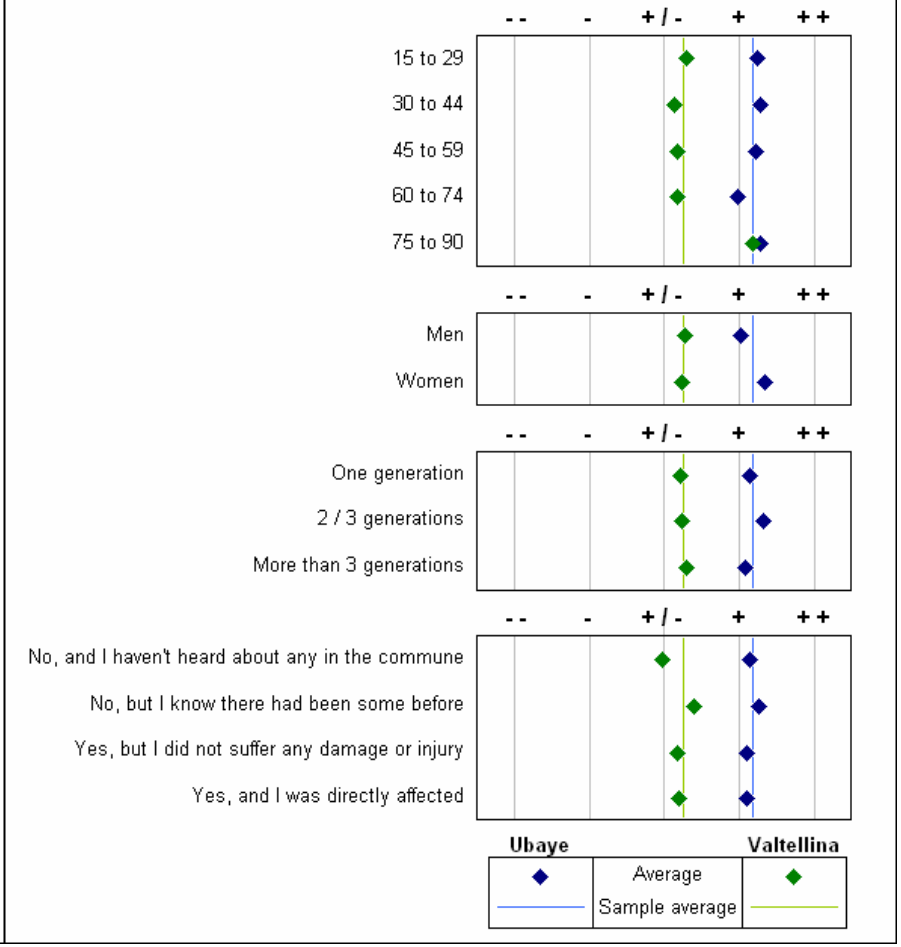
Trust in the information received from the Région / Regione



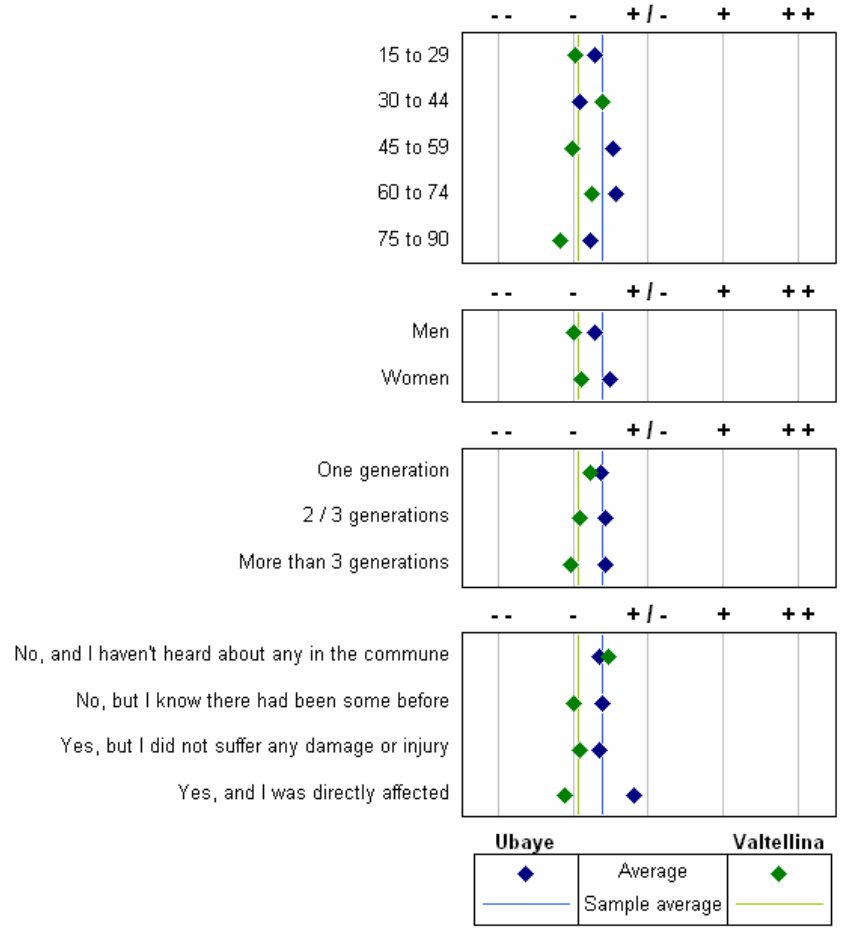
Trust in the information received from the state



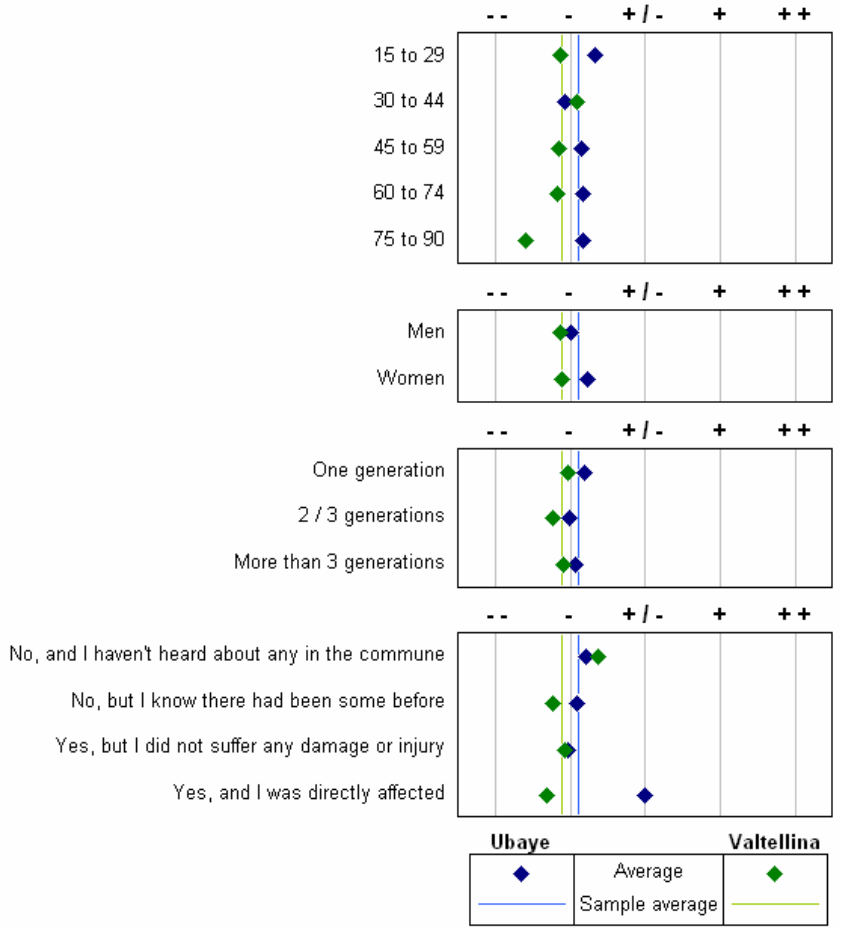
Trust in the information received from civil protection



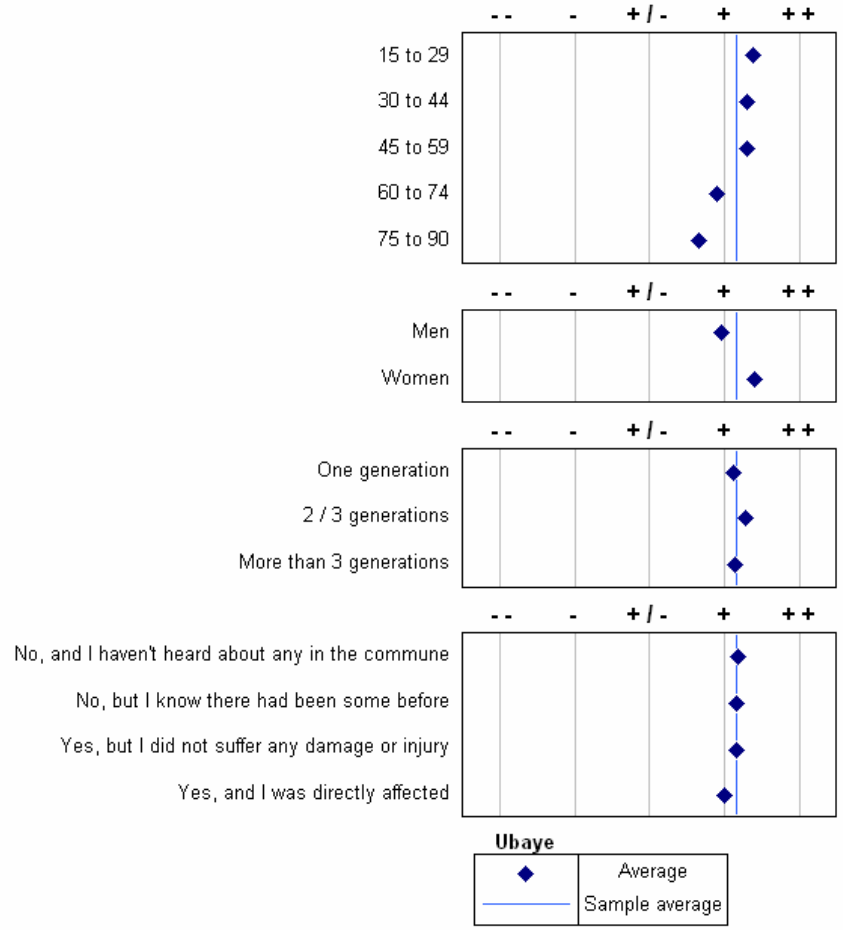
Trust in the information received from the media



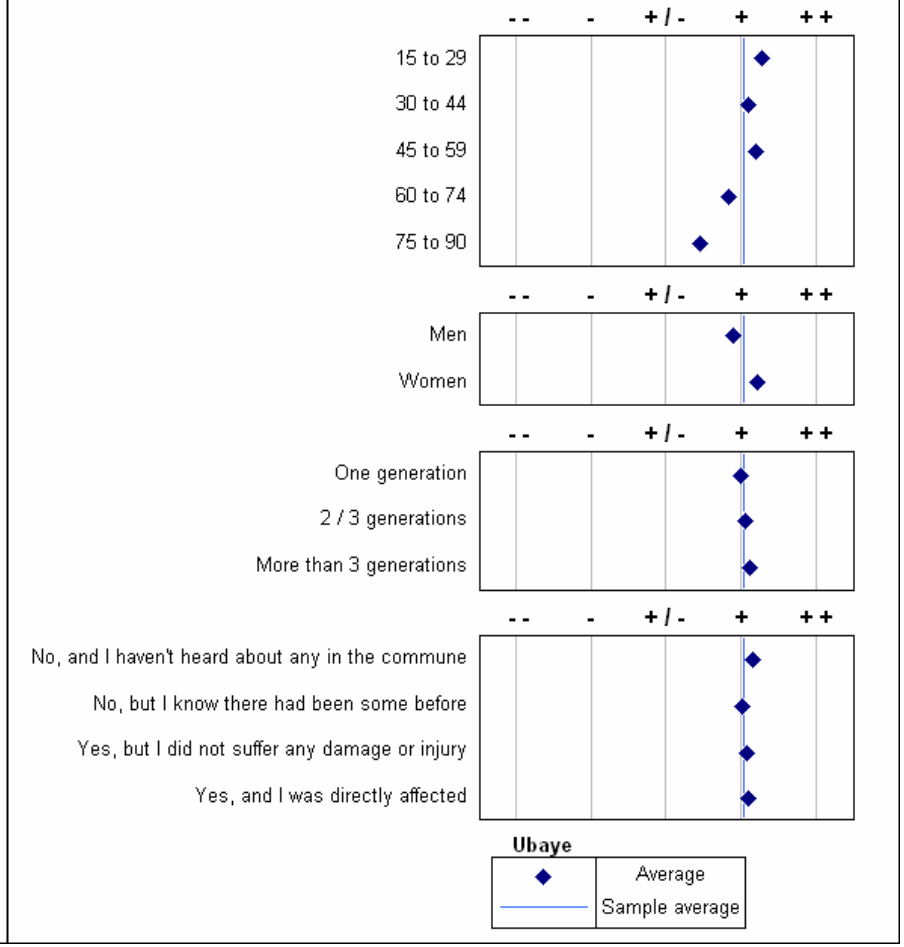
Trust in the information received from insurance companies



Trust in the information received from scientists

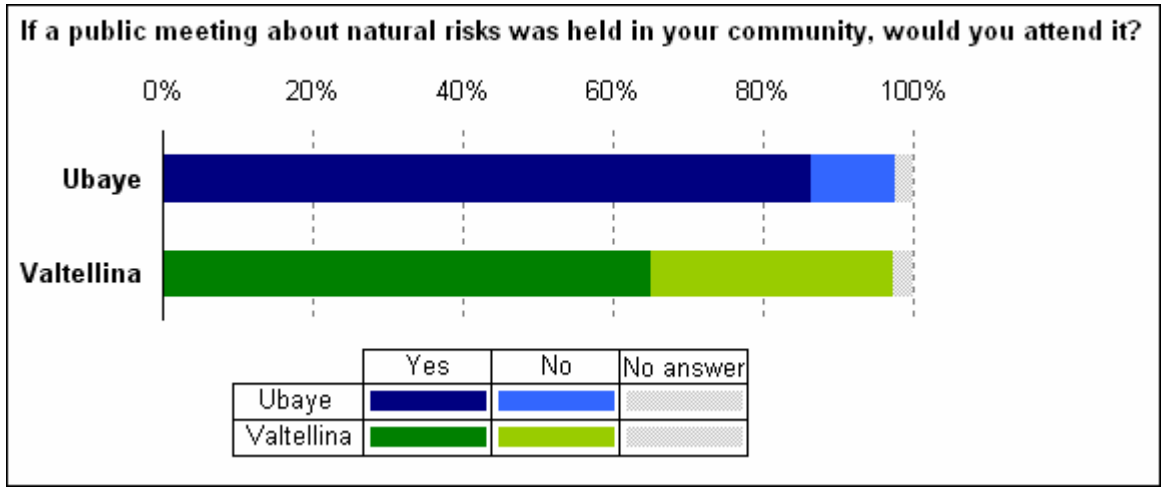


Trust in the information received from the RTM services



Question: If a public meeting about natural hazards and risks was organised in your community, would you attend be willing to attend it?

	Ubaye		Valtellina	
Yes	297	86%	314	65%
No	39	11%	156	32%
No answer	8	2%	13	3%
Total	344	100%	483	100%



Crossing this question with age

		Ubaye				Valtellina			
		Yes	No	No answer	Total	Yes	No	No answer	Total
Age groups	Sample	86%	11%	2%	100%	65%	32%	3%	100%
	15 to 29	86%	14%	0%	100%	55%	41%	4%	100%
	30 to 44	84%	15%	1%	100%	82%	18%	0%	100%
	45 to 59	92%	7%	1%	100%	78%	22%	0%	100%
	60 to 74	83%	12%	5%	100%	94%	0%	6%	100%
	75 to 89	90%	7%	3%	100%	67%	33%	0%	100%
	90 and +	50%	50%	0%	100%	-	-	-	-

Crossing this question with gender by the use of indices

	Ubaye				Valtellina			
	Yes	No	No answer	Total	Yes	No	No answer	Total
Sample	86%	11%	2%	100%	65%	32%	3%	100%
Men	88%	11%	1%	100%	59%	36%	5%	100%
Women	84%	12%	4%	100%	69%	30%	1%	100%

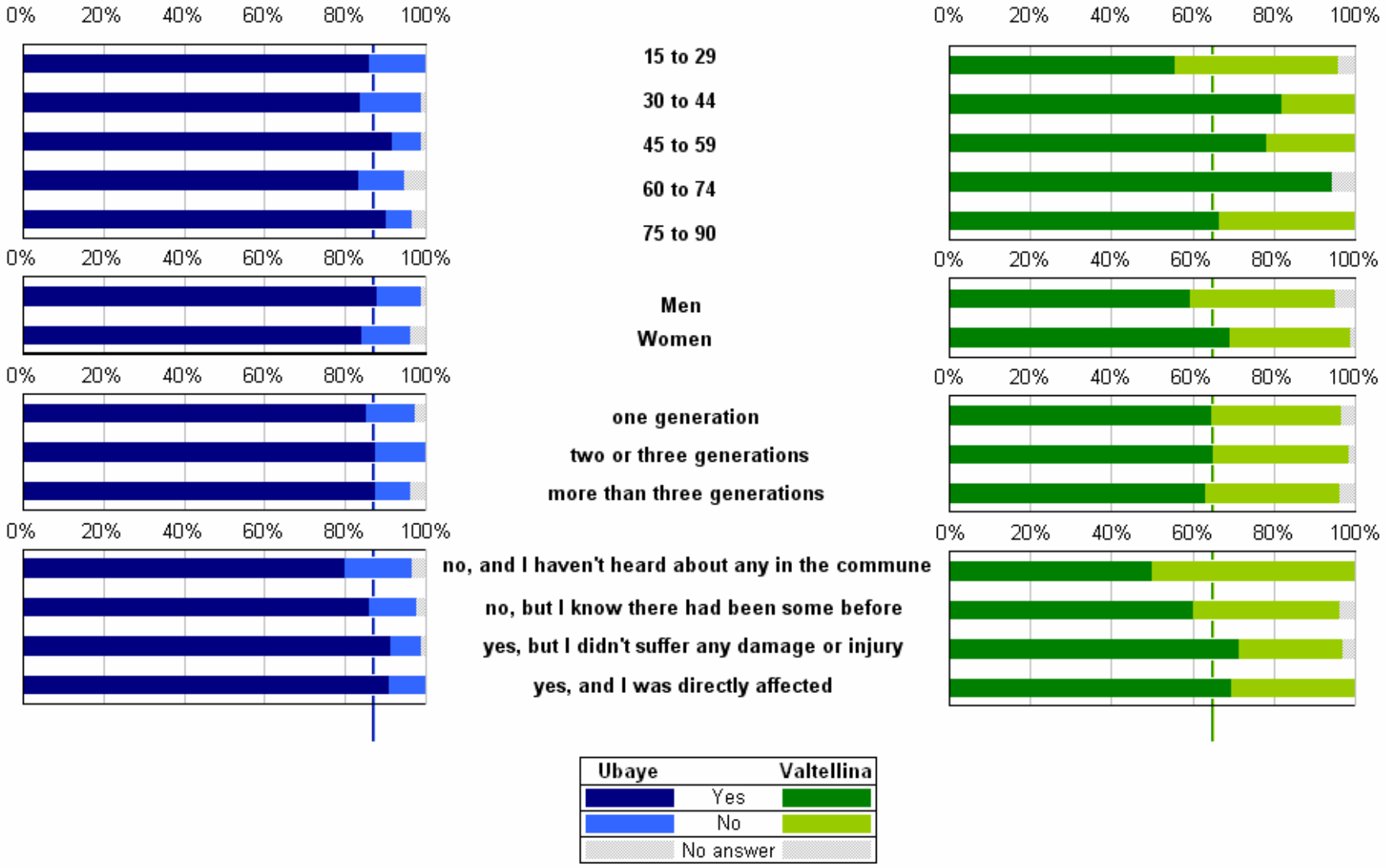
Crossing this question with ancientness in the valley (in generations) by the use of indices

		Ubaye				Valtellina			
		Yes	No	No answer	Total	Yes	No	No answer	Total
Ancientness	Sample	86%	11%	2%	100%	65%	32%	3%	100%
	One generation	85%	12%	3%	100%	65%	32%	3%	100%
	Two or three generations	87%	13%	0%	100%	65%	34%	1%	100%
	More than three generations	87%	9%	4%	100%	63%	33%	4%	100%

Crossing this question with former experiences with natural disasters by the use of indices

		Ubaye				Valtellina			
		Yes	No	No answer	Total	Yes	No	No answer	Total
Age groups	Sample	86%	11%	2%	100%	65%	32%	3%	100%
	No, and I haven't heard about any in the commune	80%	17%	3%	100%	50%	50%	0%	100%
	No, but I know there had been some before	86%	12%	2%	100%	60%	36%	4%	100%
	Yes, but I didn't suffer any damage or injury	91%	8%	1%	100%	72%	26%	3%	100%
	Yes, and I was directly affected	91%	9%	0%	100%	69%	31%	0%	100%

If a public meeting about natural risks was held in your community, would you attend it?

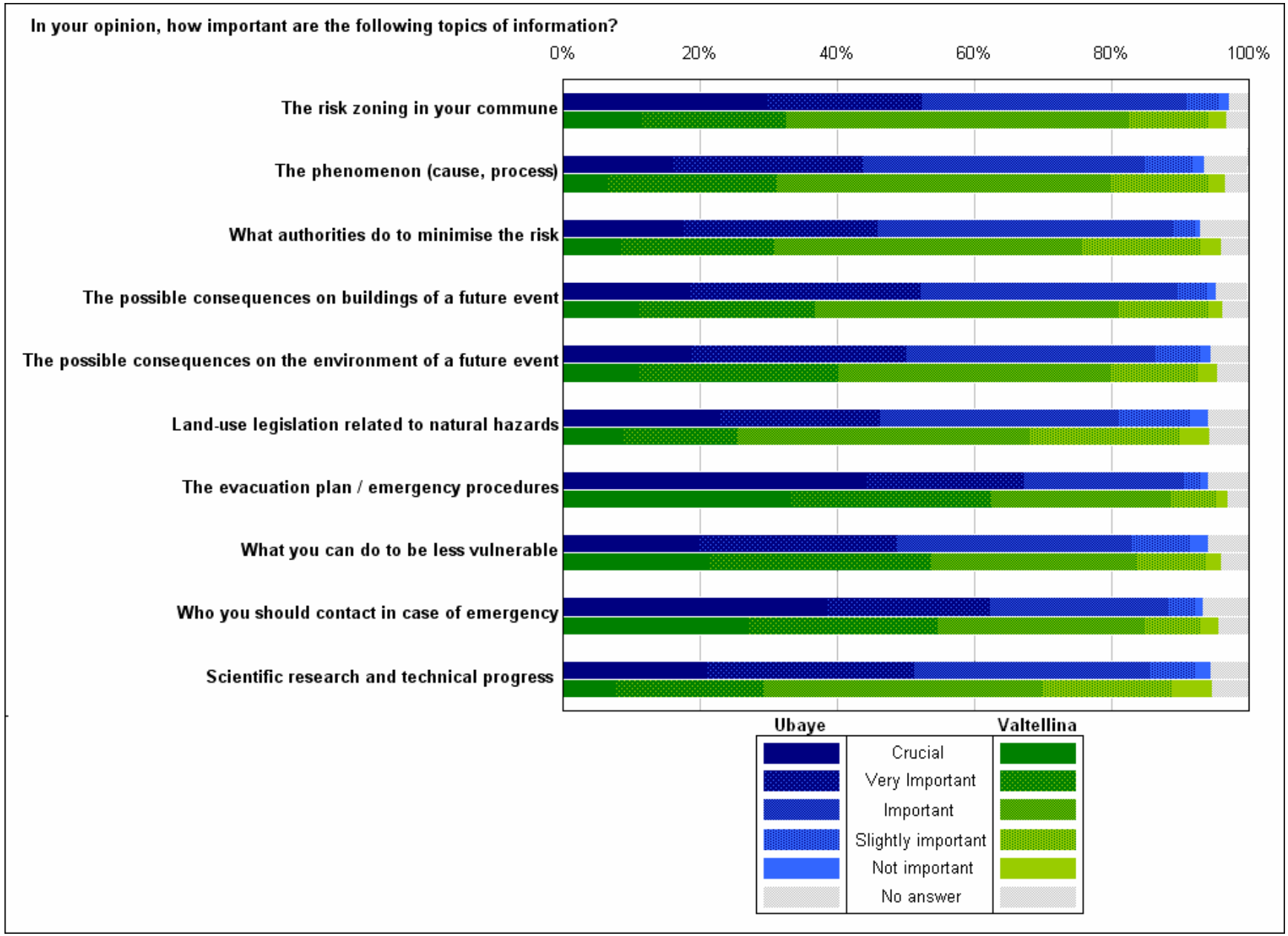


Question: Please read the following list of topics related to natural hazards and risks in your community, and indicate how important you think it is to receive information about each of them.

++	Crucial
+	Very important
+/-	Important
-	Slightly important
--	Not important
#	No answer

a.	The risk zoning in your commune
b.	The phenomenon (cause, process)
c.	What authorities do to minimise the risk
d.	The possible consequences on buildings of a future event
e.	The possible consequences on the environment of a future event
f.	Land-use legislation related to natural hazards
g.	The evacuation plan / emergency procedures
h.	What you can do to be less vulnerable
i.	Who you should contact in case of emergency
j.	Scientific research and technical progress

		a.	b.	c.	d.	e.	f.	g.	h.	i.	j.
	Ubaye										
++	**Crucial**	30%	16%	17%	19%	19%	23%	44%	20%	39%	21%
+	**Very important**	23%	28%	28%	34%	31%	23%	23%	29%	24%	30%
+/-	**Important**	39%	41%	43%	38%	36%	35%	24%	34%	26%	34%
-	**Slightly important**	5%	7%	3%	4%	7%	10%	2%	8%	4%	7%
--	**Not important**	1%	2%	1%	1%	1%	3%	1%	3%	1%	2%
#	**No answer**	3%	6%	7%	5%	6%	6%	6%	6%	7%	6%
	Valtellina										
++	**Crucial**	12%	7%	8%	11%	11%	9%	33%	21%	27%	8%
+	**Very important**	21%	25%	22%	26%	29%	17%	29%	32%	28%	22%
+/-	**Important**	50%	49%	45%	44%	40%	43%	26%	30%	30%	41%
-	**Slightly important**	12%	14%	17%	13%	13%	22%	7%	10%	8%	19%
--	**Not important**	2%	2%	3%	2%	3%	4%	2%	2%	2%	6%
#	**No answer**	3%	4%	4%	4%	5%	6%	3%	4%	4%	5%


In your opinion, how important are the following topics of information?
0%
20%
40%
60%
80%
100%
The risk zoning in your commune
The phenomenon (cause, process)
What authorities do to minimise the risk
The possible consequences on buildings of a future event
The possible consequences on the environment of a future event
Land-use legislation related to natural hazards
The evacuation plan / emergency procedures
What you can do to be less vulnerable
Who you should contact in case of emergency
Scientific research and technical progress
Ubaye
Valtellina
Crucial
Very Important
Important
Slightly important
Not important
No answer

Crossing this question with age

		a.	b.	c.	d.	e.	f.	g.	h.	i.	j.
		Ubaye									
Age group	**Sample**	3,77	3,53	3,63	3,67	3,62	3,57	4,13	3,58	4,02	3,65
	15 to 29	3,76	3,67	3,72	3,58	3,58	3,46	4,17	3,69	4,14	3,50
	30 to 44	3,94	3,65	3,57	3,64	3,70	3,36	4,10	3,76	3,98	3,50
	45 to 59	3,63	3,56	3,61	3,69	3,58	3,62	4,21	3,67	4,04	3,75
	60 to 74	3,59	3,28	3,60	3,70	3,58	3,68	4,05	3,38	4,01	3,70
	75 to 89	4,50	3,64	3,83	3,75	3,72	3,80	4,15	3,12	3,83	3,77
	90 and +	4,50	4,00	4,00	4,00	4,00	4,50	4,50	4,00	4,50	4,00
		Valtellina									
Age group	**Sample**	3,28	3,20	3,17	3,07	3,35	3,04	3,88	3,63	3,71	3,07
	15 to 29	3,16	3,08	3,07	3,23	3,26	2,90	3,76	3,52	3,56	2,90
	30 to 44	3,39	3,39	3,47	3,55	3,55	3,23	3,96	3,73	3,92	3,45
	45 to 59	3,44	3,30	3,18	3,36	3,37	3,21	4,09	3,81	3,95	3,28
	60 to 74	3,94	3,83	3,39	3,47	3,69	3,44	4,35	4,00	4,06	3,57
	75 to 89	4,00	3,33	3,67	3,83	3,83	4,00	4,83	4,33	4,33	3,50
	90 and +	-	-	-	-	-	-	-	-	-	-

Crossing this question with gender

	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.
	Ubaye									
Sample	3,77	3,53	3,63	3,67	3,62	3,57	4,13	3,58	4,02	3,65
Men	3,66	3,48	3,56	3,67	3,51	3,53	4,01	3,38	3,84	3,58
Women	3,88	3,59	3,71	3,68	3,76	3,61	4,28	3,82	4,22	3,73
	Valtellina									
Sample	3,28	3,20	3,17	3,07	3,35	3,04	3,88	3,63	3,71	3,07
Men	3,28	3,19	3,09	3,30	3,27	2,98	3,80	3,53	3,54	3,06
Women	3,28	3,20	3,22	3,33	3,40	3,08	3,95	3,70	3,84	3,09

Crossing this question with ancientness in the valley (in generations)

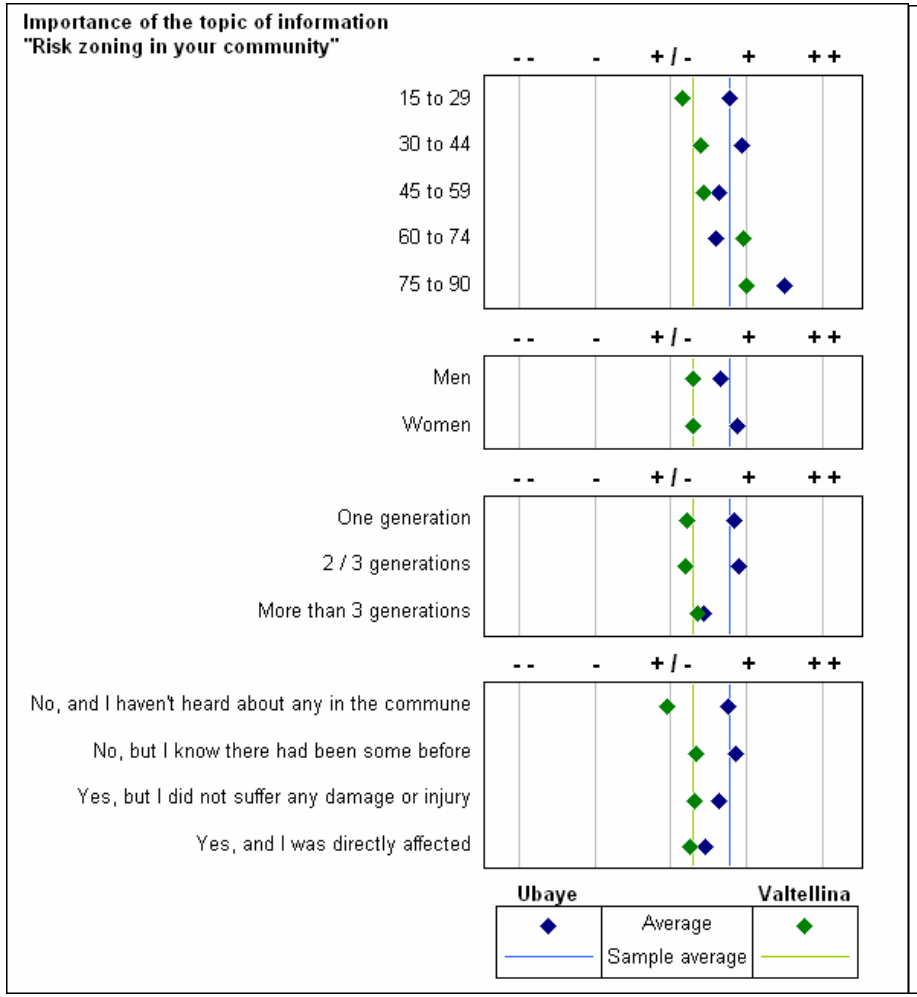
Ancientness	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.
Ubaye										
Sample	3,77	3,53	3,63	3,67	3,62	3,57	4,13	3,58	4,02	3,65
One generation	3,84	3,63	3,60	3,66	3,63	3,58	4,12	3,53	3,99	3,72
Two or three generations	3,90	3,52	3,77	3,83	3,84	3,76	4,29	3,94	4,17	3,61
More than three generations	3,43	3,28	3,55	3,52	3,36	3,30	3,99	3,38	3,93	3,46

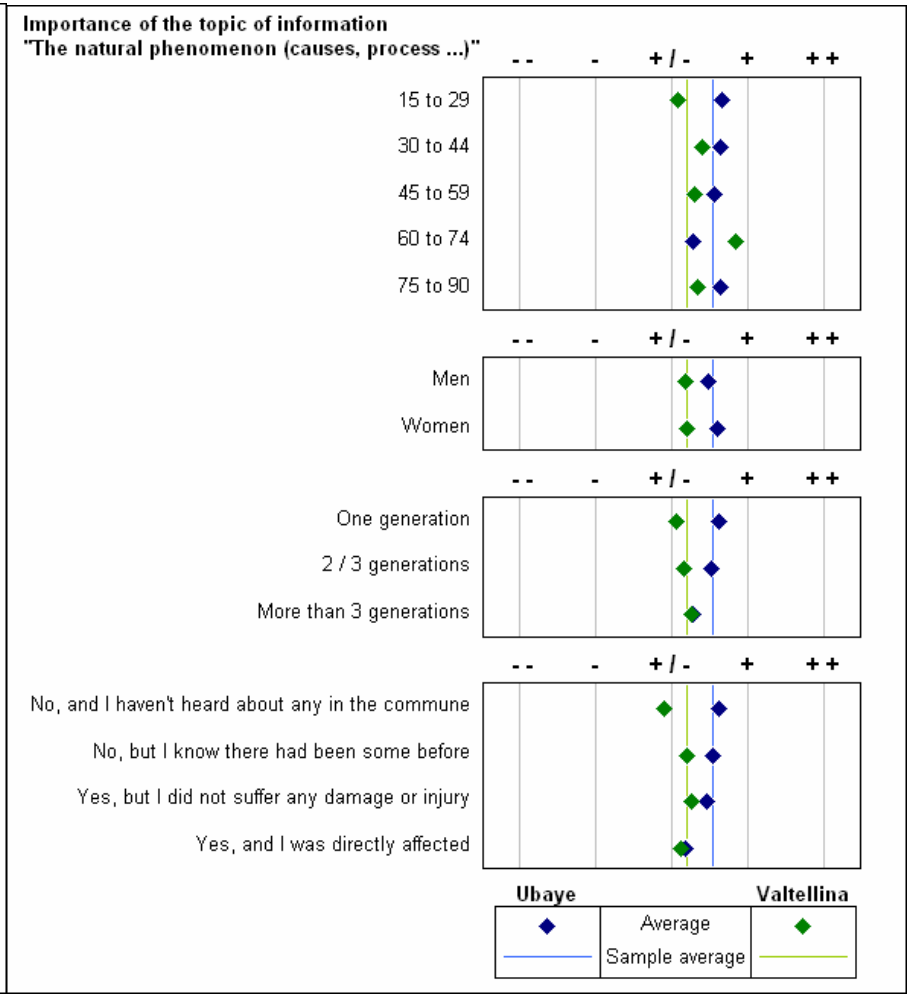
Ancientness	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.
Valtellina										
Sample	3,28	3,20	3,17	3,07	3,35	3,04	3,88	3,63	3,71	3,07
One generation	3,22	3,07	3,07	3,18	3,24	2,91	3,78	3,53	3,79	3,04
Two or three generations	3,20	3,16	3,23	3,42	3,46	3,02	3,83	3,63	3,74	3,15
More than three generations	3,35	3,25	3,12	3,28	3,31	3,06	3,93	3,63	3,69	3,01

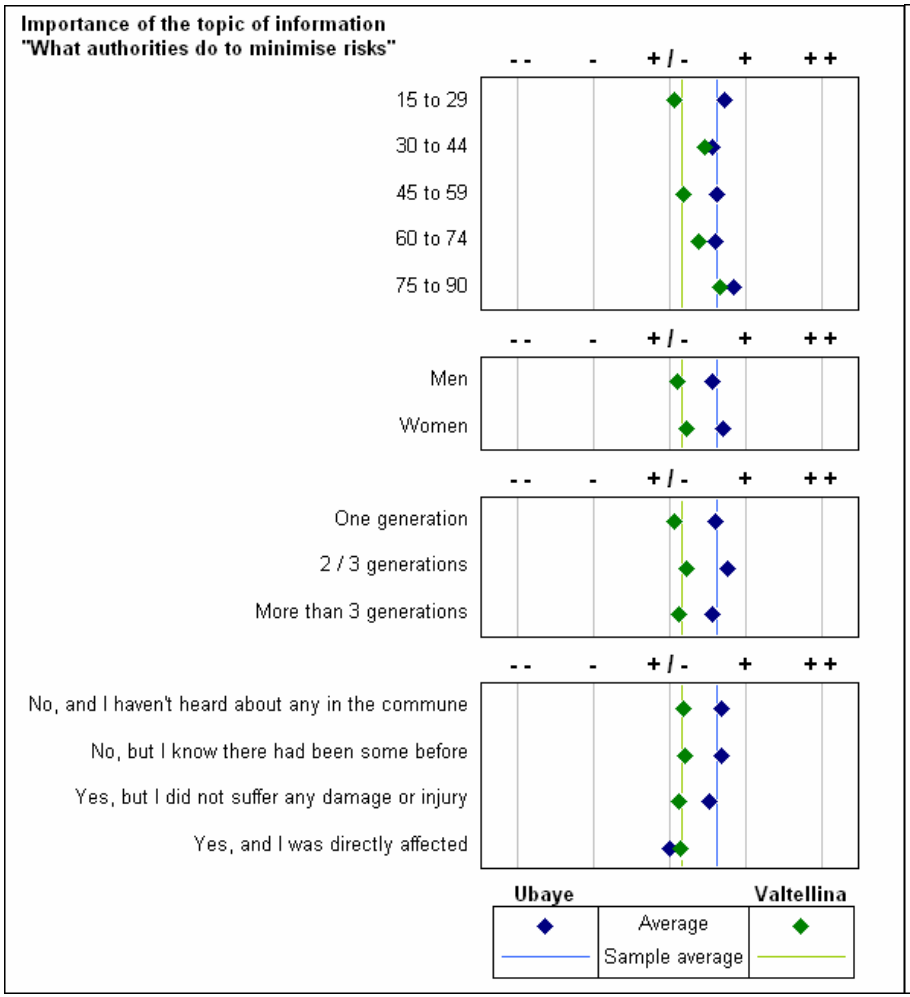
Crossing this question with former experiences with natural disasters

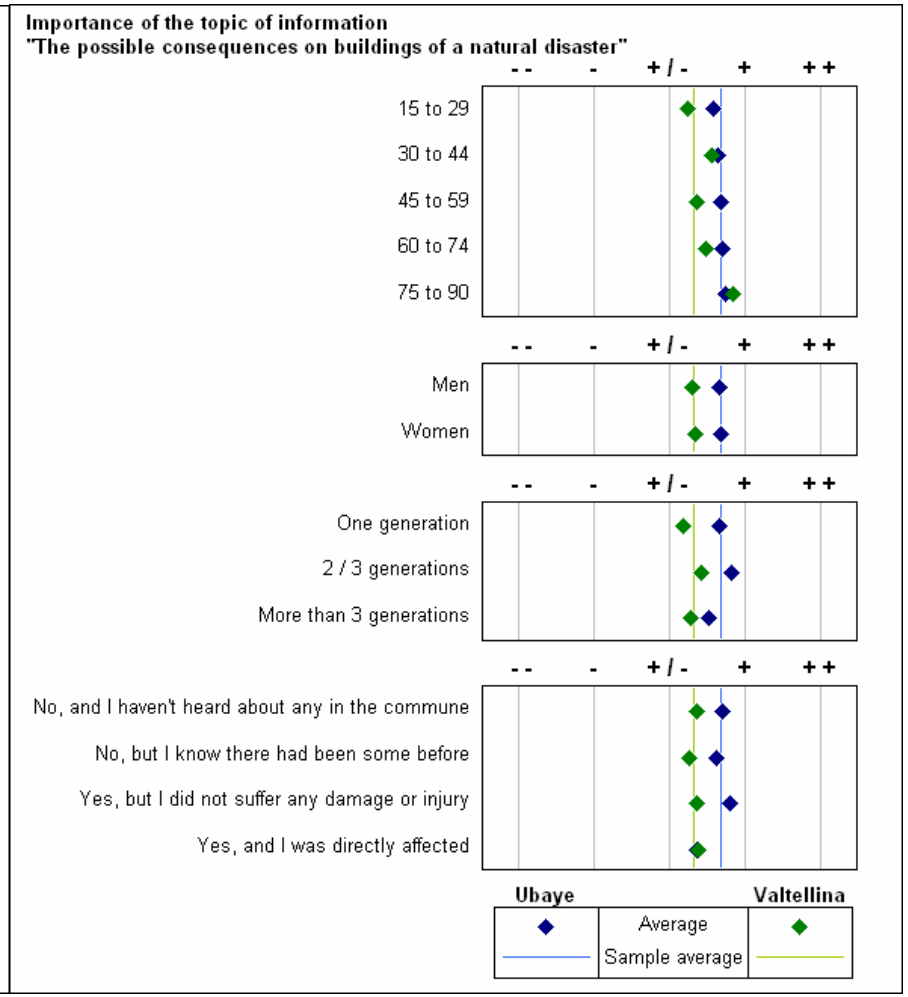
Age group	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.
Ubaye										
Sample	3,77	3,53	3,63	3,67	3,62	3,57	4,13	3,58	4,02	3,65
No, and I haven't heard about any in the commune	3,75	3,62	3,68	3,71	3,69	3,53	4,14	3,64	3,91	3,67
No, but I know there had been some before	3,85	3,55	3,69	3,63	3,58	3,59	4,24	3,68	4,12	3,63
Yes, but I didn't suffer any damage or injury	3,62	3,47	3,52	3,80	3,73	3,51	3,95	3,38	3,92	3,69
Yes, and I was directly affected	3,45	3,18	3,00	3,36	3,36	3,60	3,55	3,36	3,55	3,27

Age group	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.
Valtellina										
Sample	3,28	3,20	3,17	3,07	3,35	3,04	3,88	3,63	3,71	3,07
No, and I haven't heard about any in the commune	2,95	2,90	3,17	3,37	3,12	2,98	3,22	3,27	3,24	2,88
No, but I know there had been some before	3,33	3,20	3,20	3,26	3,33	3,01	3,96	3,60	3,76	3,09
Yes, but I didn't suffer any damage or injury	3,32	3,27	3,13	3,35	3,41	3,11	3,94	3,69	3,74	3,14
Yes, and I was directly affected	3,26	3,11	3,15	3,37	3,43	2,94	4,00	3,83	3,89	2,88

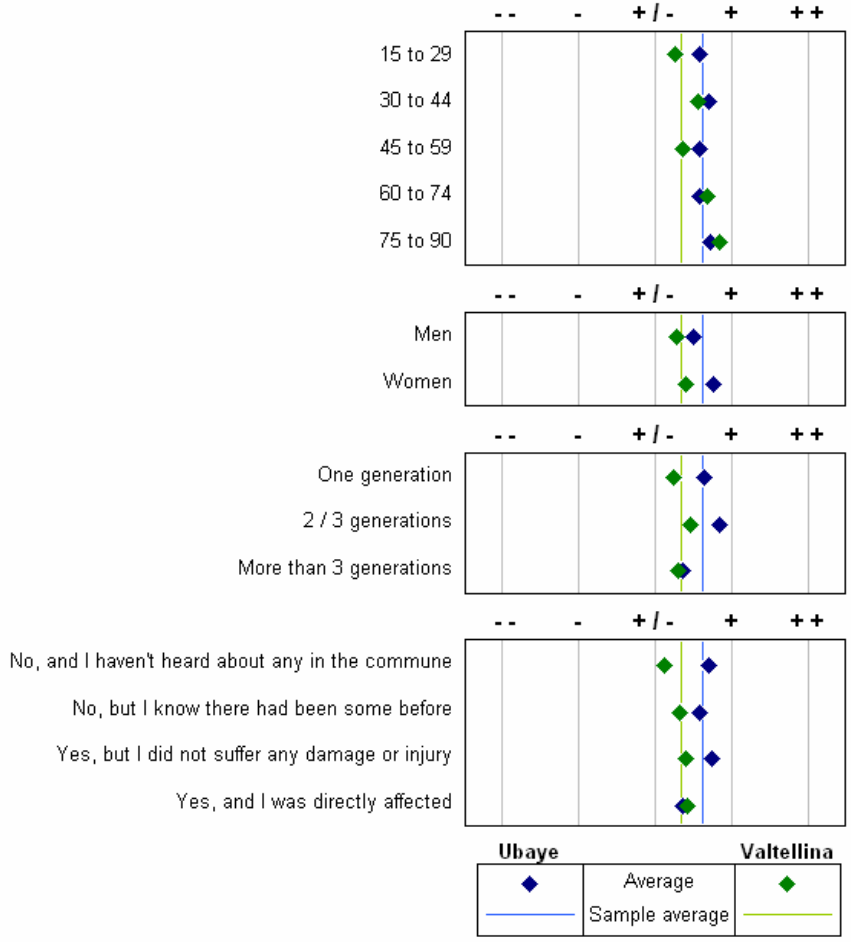

Importance of the topic of information
"Risk zoning in your community"
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average


Importance of the topic of information
"The natural phenomenon (causes, process ...)"
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average

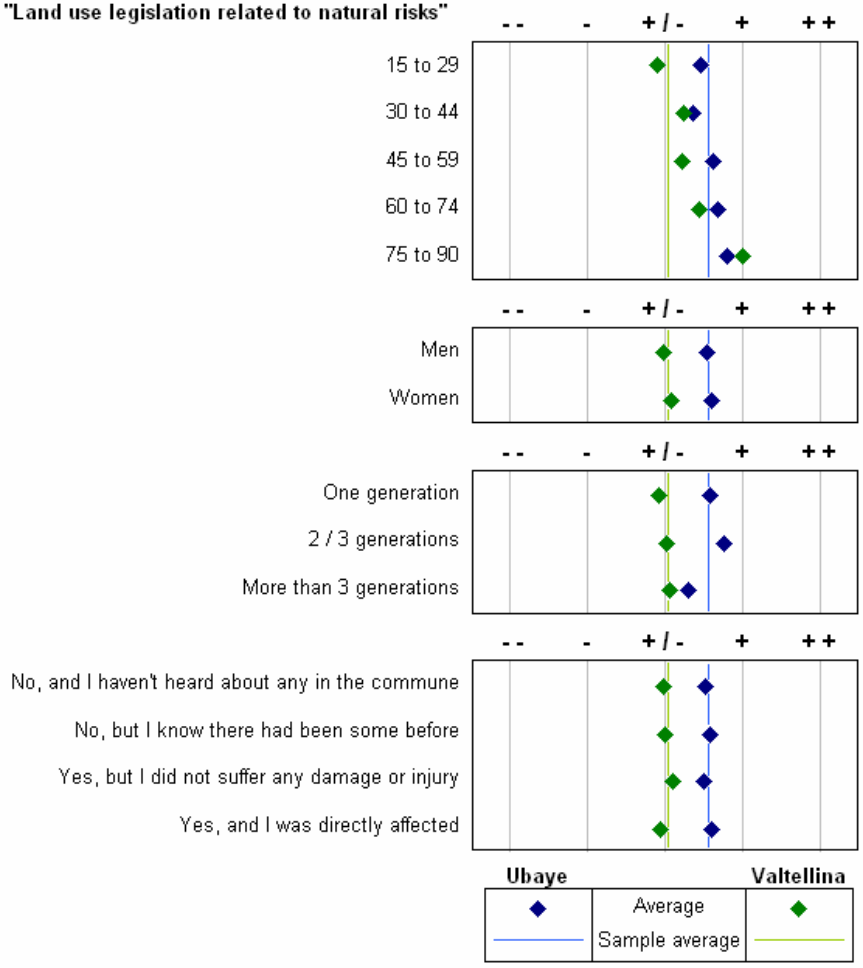

Importance of the topic of information
"What authorities do to minimise risks"
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average

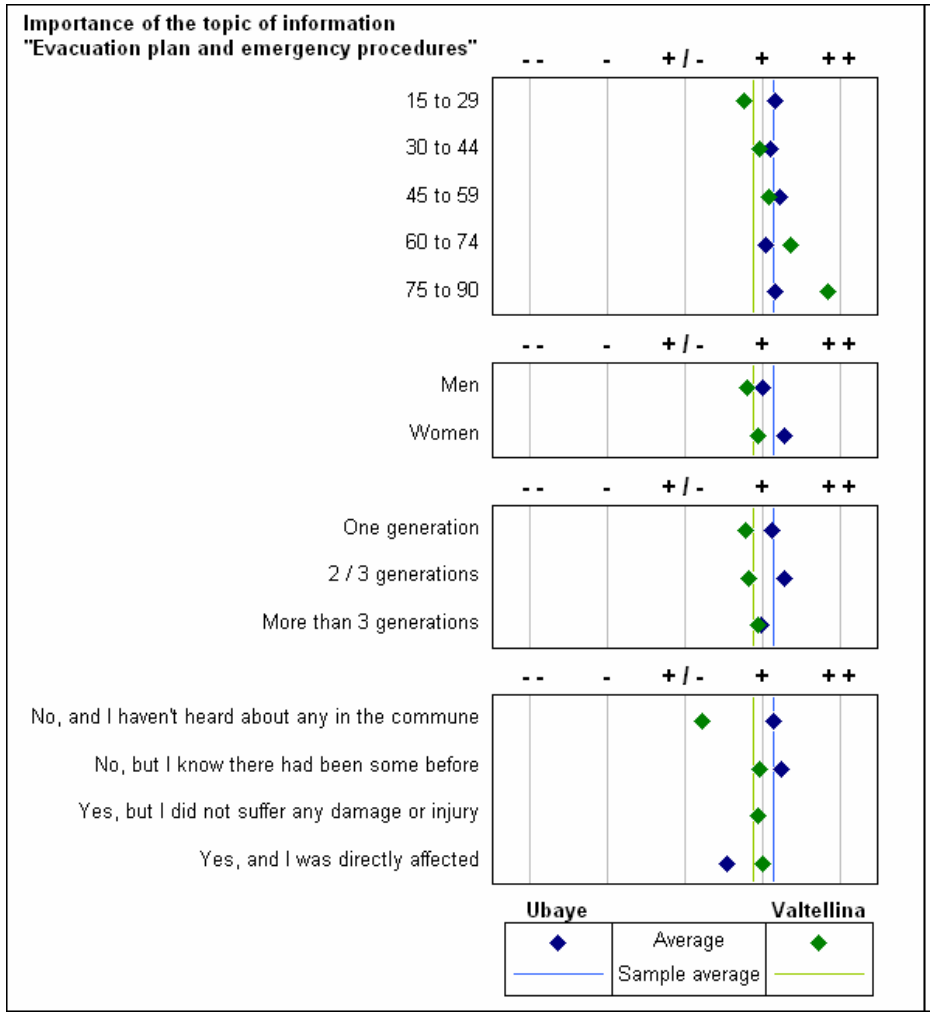

Importance of the topic of information
"The possible consequences on buildings of a natural disaster"
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average

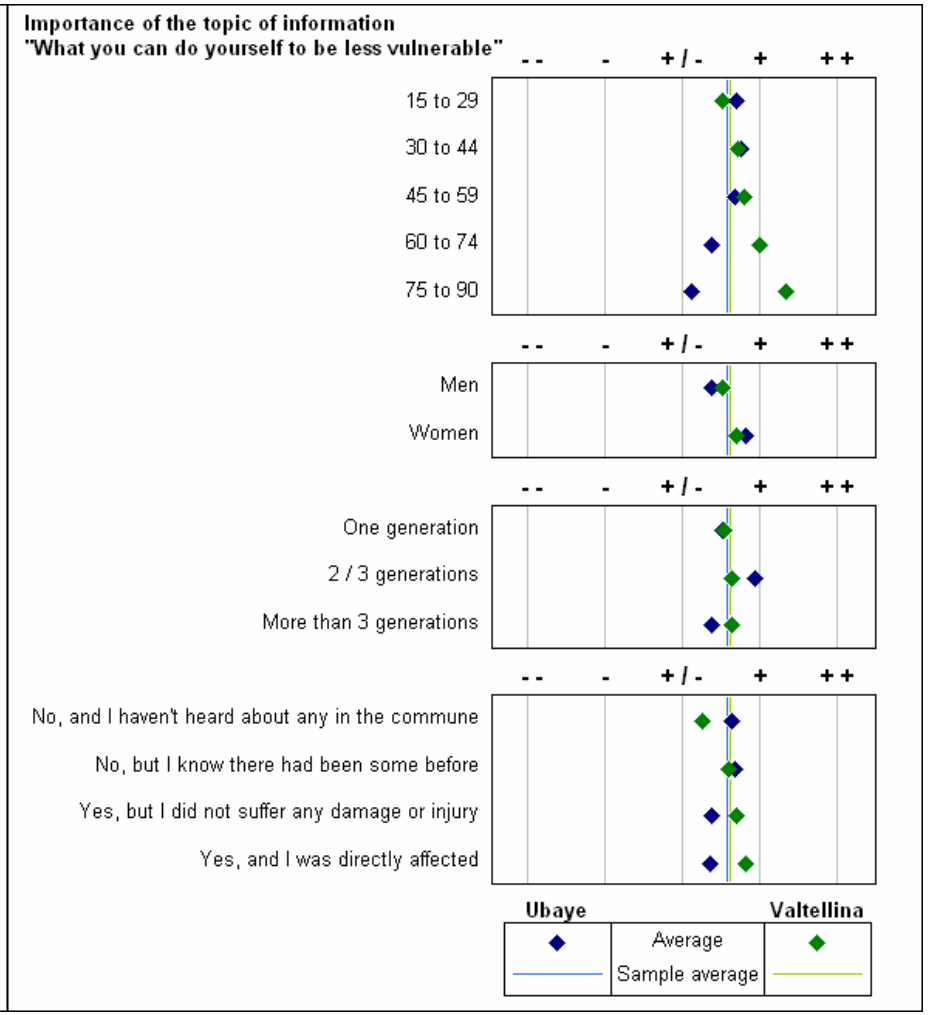
Importance of the topic of information
"The possible consequences on the environment of a natural disaster"

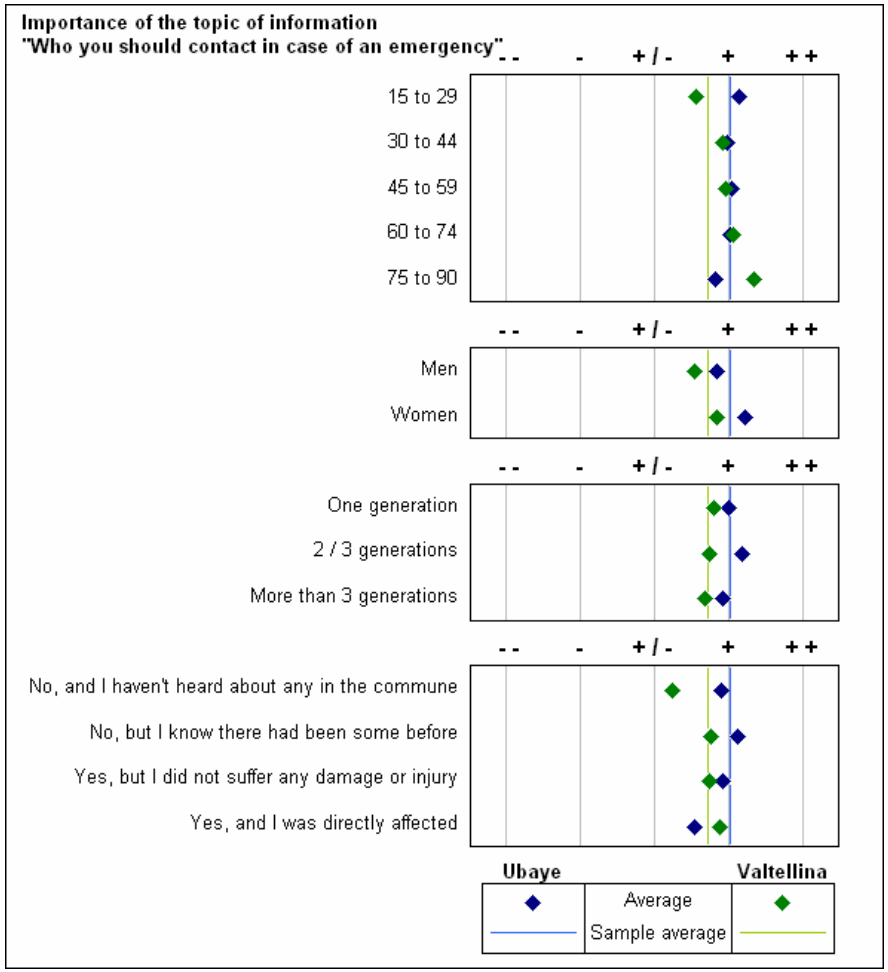


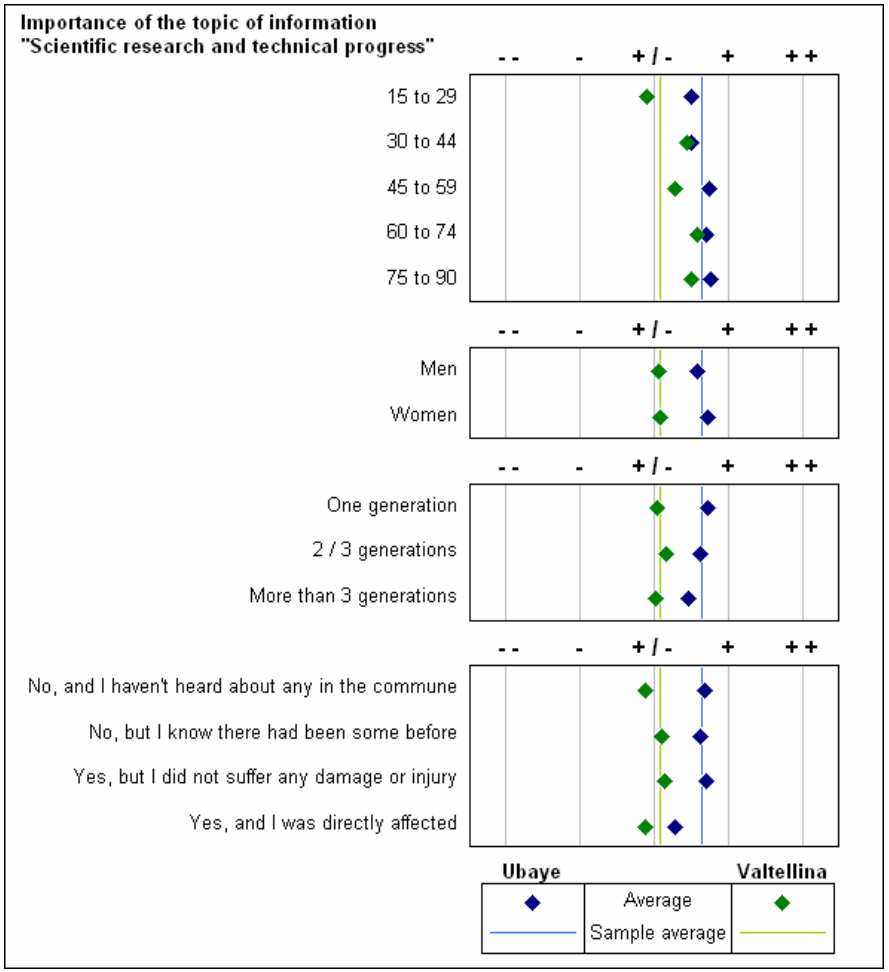
Importance of the topic of information
"Land use legislation related to natural risks"




Importance of the topic of information
"Evacuation plan and emergency procedures"
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average


Importance of the topic of information
"What you can do yourself to be less vulnerable"
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average

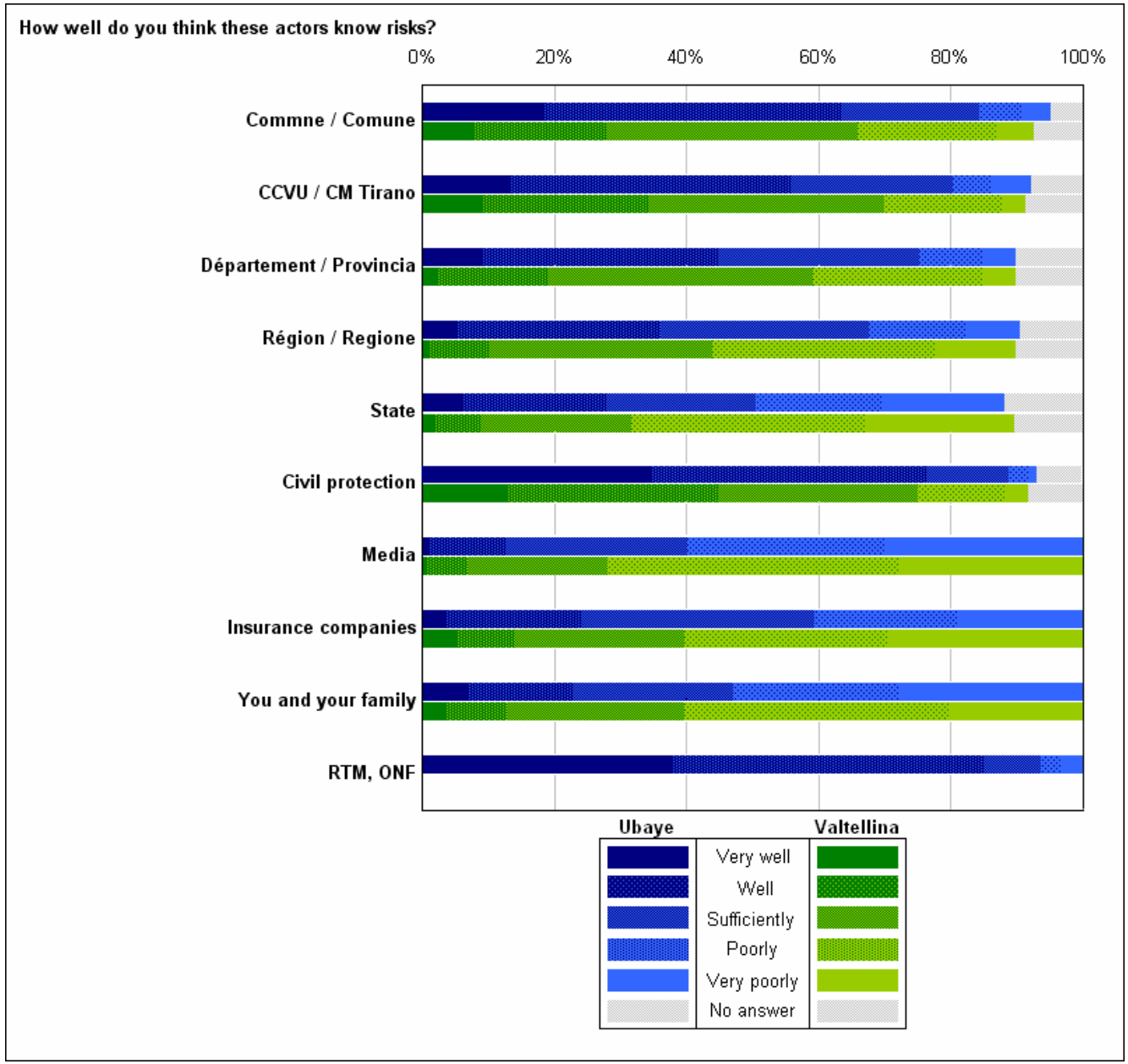

Importance of the topic of information
"Who you should contact in case of an emergency"
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average


Importance of the topic of information
"Scientific research and technical progress"
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average

Question: How well do you think these actors know risks?

++	Very well
+	Well
+/-	Sufficiently
-	Poorly
--	Very poorly
#	No answer

		Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Civil Protection	Mass media	Insurance companies	You	RTM, ONF
	Ubaye										
++	**Very well**	18%	13%	9%	6%	6%	35%	1%	3%	6%	34%
+	**Well**	45%	42%	36%	31%	22%	42%	10%	19%	13%	43%
+/-	**Sufficiently**	21%	24%	30%	32%	23%	13%	24%	32%	20%	8%
-	**Poorly**	7%	6%	10%	15%	19%	3%	26%	20%	21%	3%
--	**Very poorly**	4%	6%	5%	8%	18%	1%	26%	17%	23%	3%
#	**No answer**	5%	8%	10%	10%	12%	7%	14%	8%	16%	9%
	Valtellina										
++	**Very well**	8%	9%	2%	1%	2%	13%	1%	5%	3%	
+	**Well**	20%	25%	17%	9%	7%	32%	5%	8%	8%	
+/-	**Sufficiently**	38%	36%	40%	34%	23%	30%	19%	23%	24%	
-	**Poorly**	21%	18%	26%	34%	36%	13%	39%	27%	36%	
--	**Very poorly**	6%	4%	5%	12%	22%	4%	25%	26%	18%	
#	**No answer**	7%	9%	10%	10%	10%	8%	11%	11%	10%	


How well do you think these actors know risks?
0%
20%
40%
60%
80%
100%
Commne / Comune
CCVU / CM Tirano
Département / Provincia
Région / Regione
State
Civil protection
Media
Insurance companies
You and your family
RTM, ONF
Ubaye
Valtellina
Very well
Well
Sufficiently
Poorly
Very poorly
No answer

Crossing this question with age

		Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Civil Protection	Mass media	Insurance companies	You	RTM, ONF
	Ubaye										
Age group	**Sample**	3,71	3,56	3,39	3,12	2,76	4,13	2,24	2,69	2,50	4,13
	15 to 29	3,51	3,51	3,35	3,06	2,74	4,14	2,23	2,66	2,39	4,11
	30 to 44	3,60	3,35	3,25	2,99	2,75	4,14	1,96	2,39	2,45	4,13
	45 to 59	3,83	3,67	3,41	3,20	2,80	4,18	2,40	2,56	2,71	4,34
	60 to 74	3,74	3,65	3,46	3,11	2,71	4,11	2,30	2,62	2,94	4,01
	75 to 89	3,75	3,60	3,50	3,35	2,65	4,00	2,53	2,71	3,04	3,73
	90 and +	4,00	4,00	4,00	4,00	4,00	4,00	3,00	3,50	3,00	4,00
	Valtellina										
Age group	**Sample**	3,04	3,21	2,84	2,48	2,23	3,41	2,08	2,29	2,36	
	15 to 29	2,97	3,26	2,79	2,47	2,23	3,34	2,10	2,26	2,32	
	30 to 44	3,16	3,23	3,02	2,63	2,27	3,48	2,18	2,38	2,39	
	45 to 59	3,05	3,01	2,92	2,51	2,25	3,43	2,00	2,46	2,49	
	60 to 74	3,50	3,07	2,85	2,00	1,80	3,88	1,63	1,88	2,50	
	75 to 89	4,00	3,33	2,83	2,40	2,00	4,33	1,80	1,60	2,00	
	90 and +	-	-	-	-	-	-	-	-	-	

Crossing this question with gender

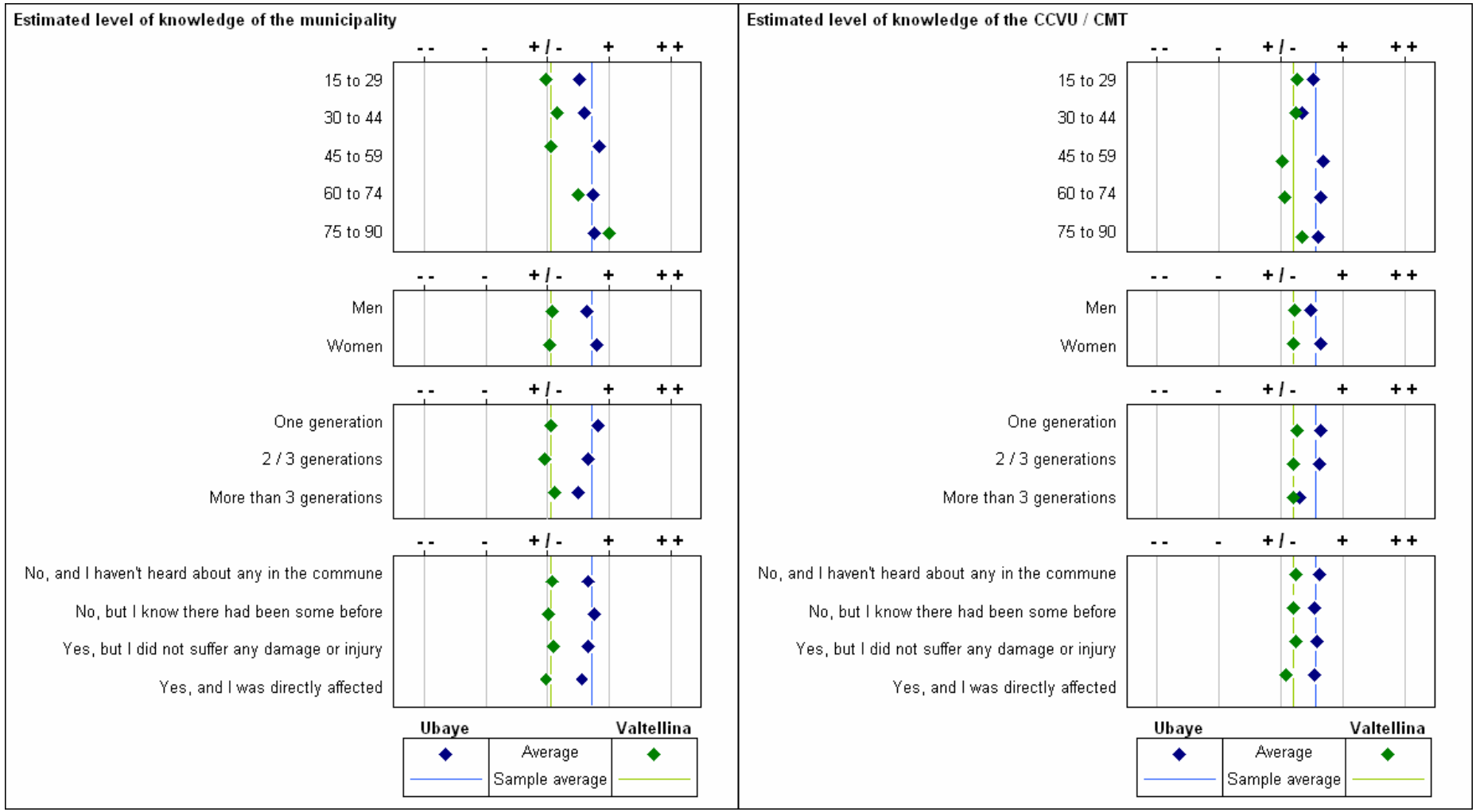
		Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Civil Protection	Mass media	Insurance companies	You	RTM, ONF
	Ubaye										
Gender	**Sample**	3,71	3,56	3,39	3,12	2,76	4,13	2,24	2,69	2,50	4,13
	Men	3,63	3,48	3,33	3,05	2,74	4,10	2,23	2,47	2,80	4,19
	Women	3,79	3,65	3,45	3,19	2,76	4,16	2,25	2,53	2,55	4,06
	Valtellina										
Gender	**Sample**	3,04	3,21	2,84	2,48	2,23	3,41	2,08	2,29	2,36	
	Men	3,06	3,22	2,84	2,40	2,16	3,34	2,08	2,32	2,54	
	Women	3,03	3,19	2,85	2,54	2,28	3,46	2,09	2,28	2,22	

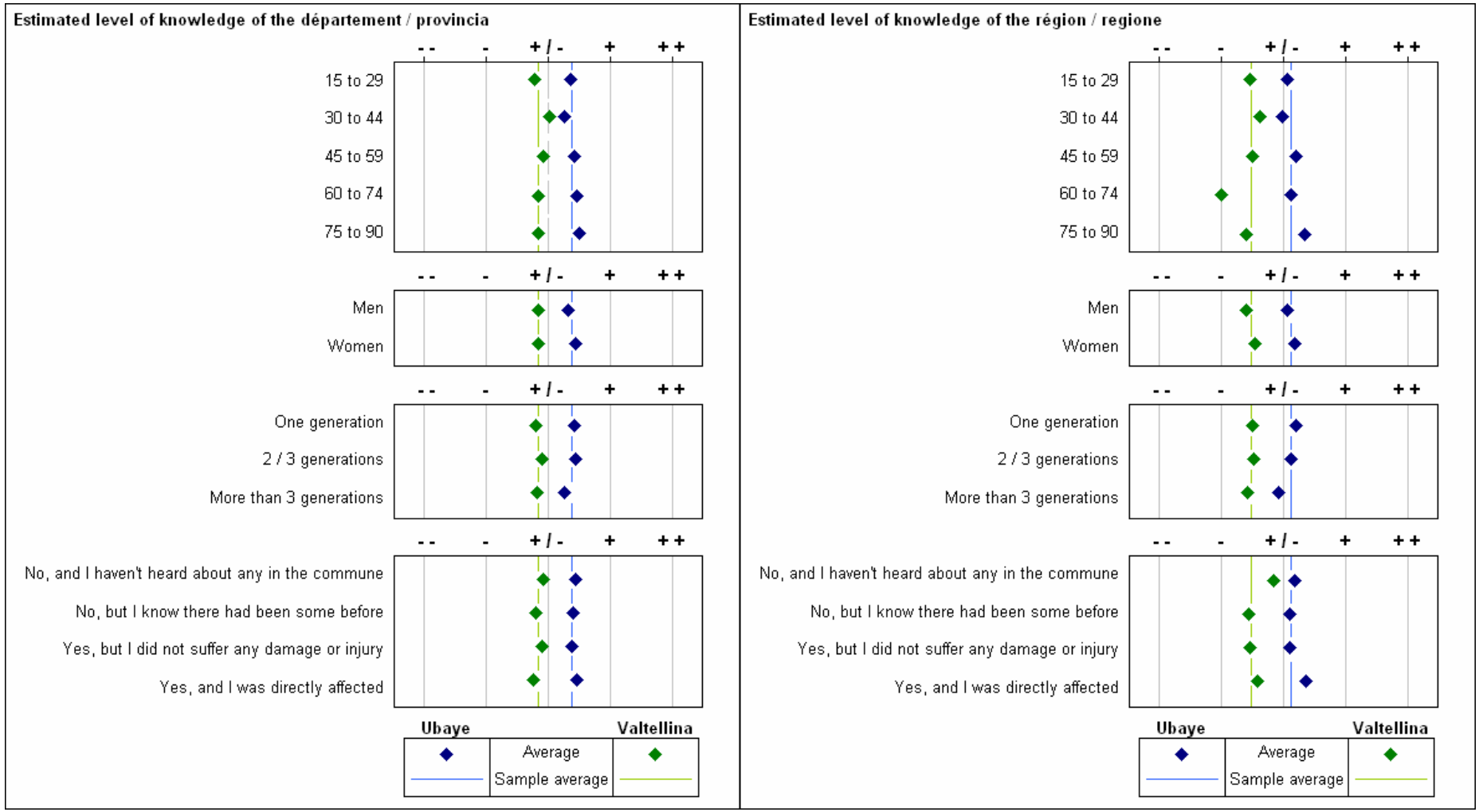
Crossing this question with ancientness in the valley (in generations)

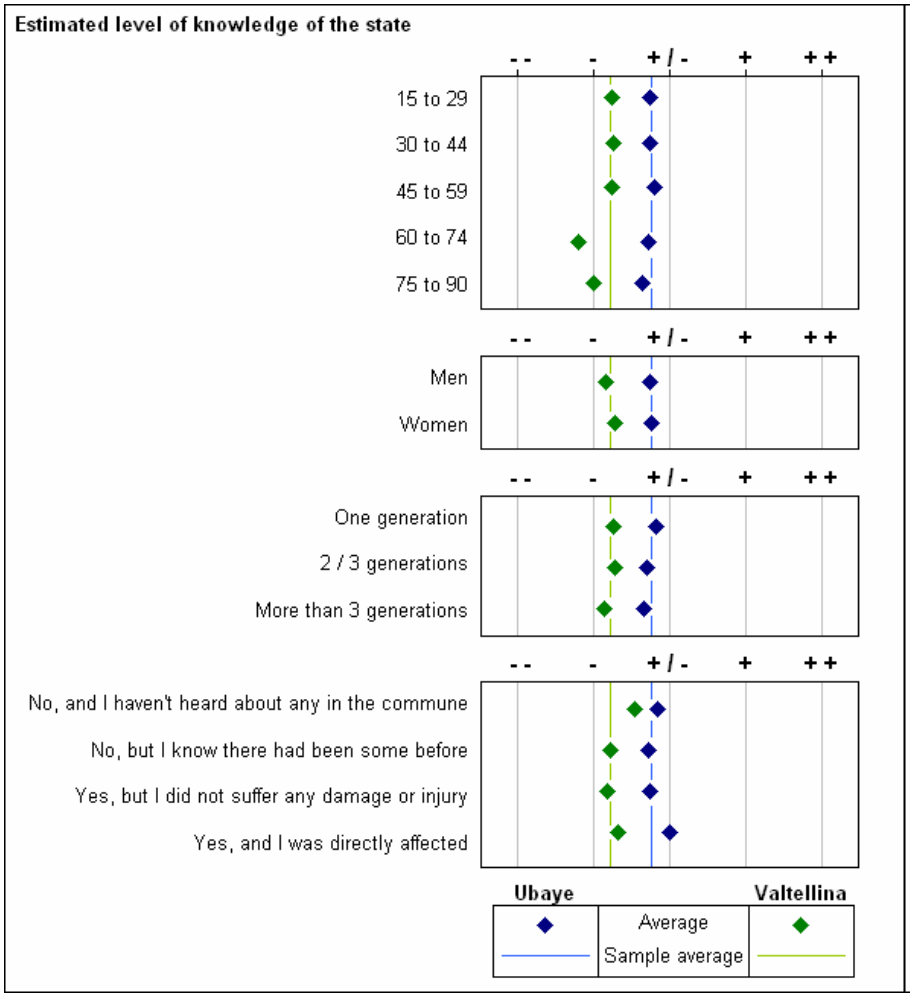
Ancientness	Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Civil Protection	Mass media	Insurance companies	You	RTM, ONF
Ubaye										
Sample	3,71	3,56	3,39	3,12	2,76	4,13	2,24	2,69	2,50	4,13
One generation	3,82	3,65	3,42	3,21	2,82	4,26	2,37	2,64	2,63	4,16
Two or three generations	3,66	3,62	3,44	3,12	2,71	3,99	2,21	2,35	2,70	4,04
More than three generations	3,50	3,30	3,26	2,91	2,66	3,91	1,92	2,28	2,80	4,13
Valtellina										
Sample	3,04	3,21	2,84	2,48	2,23	3,41	2,08	2,29	2,36	
One generation	3,05	3,25	2,80	2,49	2,25	3,30	2,31	2,45	2,50	
Two or three generations	2,94	3,20	2,90	2,53	2,28	3,41	2,03	2,43	2,21	
More than three generations	3,10	3,21	2,81	2,42	2,14	3,43	2,02	2,13	2,44	

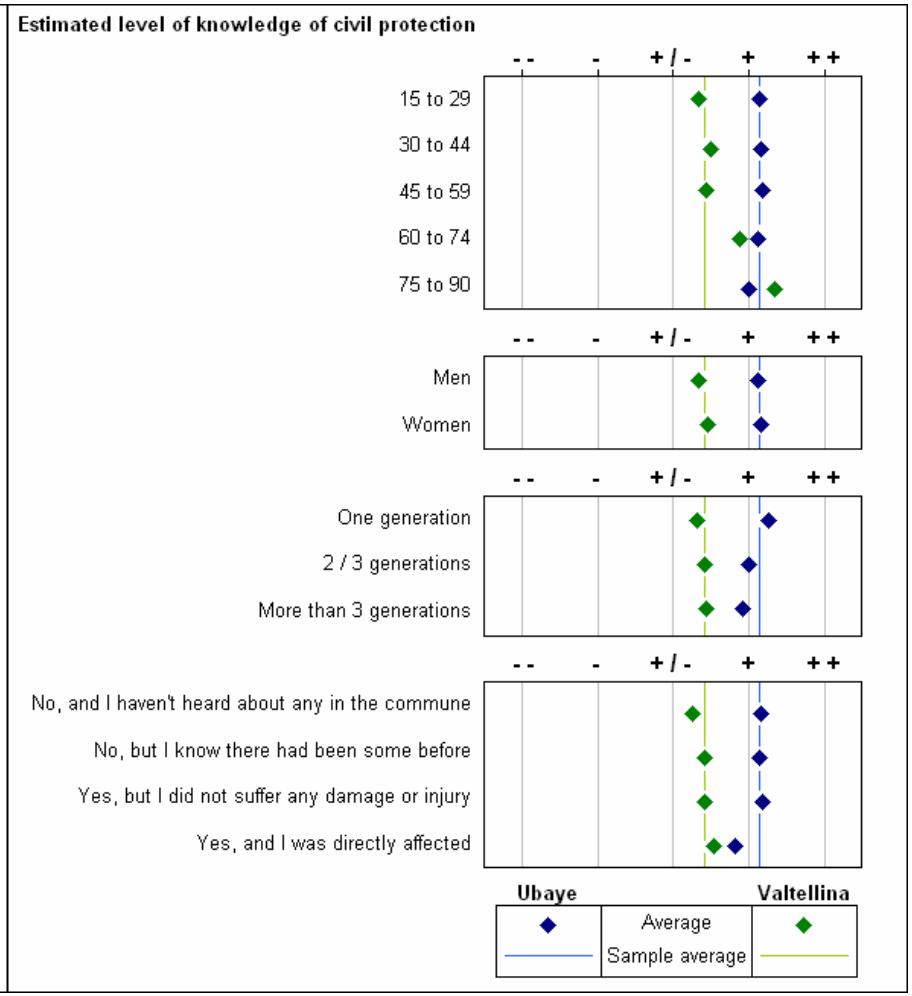
Crossing this question with former experiences with natural disasters

Experience with disaster	Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Civil Protection	Mass media	Insurance companies	You	RTM, ONF
Ubaye										
Sample	3,71	3,56	3,39	3,12	2,76	4,13	2,24	2,69	2,50	4,13
No, and I haven't heard about any in the commune	3,66	3,63	3,43	3,19	2,85	4,15	2,39	2,63	2,47	4,04
No, but I know there had been some before	3,75	3,55	3,40	3,10	2,71	4,14	2,29	2,52	2,65	4,12
Yes, but I didn't suffer any damage or injury	3,66	3,58	3,37	3,10	2,75	4,17	2,01	2,22	2,83	4,24
Yes, and I was directly affected	3,55	3,55	3,45	3,36	3,00	3,82	2,50	3,10	3,00	4,09
Valtellina										
Sample	3,04	3,21	2,84	2,48	2,23	3,41	2,08	2,29	2,36	
No, and I haven't heard about any in the commune	3,08	3,24	2,92	2,83	2,54	3,24	2,53	2,39	2,16	
No, but I know there had been some before	3,02	3,20	2,80	2,43	2,22	3,41	2,13	2,35	2,28	
Yes, but I didn't suffer any damage or injury	3,08	3,24	2,90	2,46	2,17	3,41	1,97	2,25	2,43	
Yes, and I was directly affected	2,97	3,09	2,76	2,57	2,31	3,53	2,00	2,20	2,66	

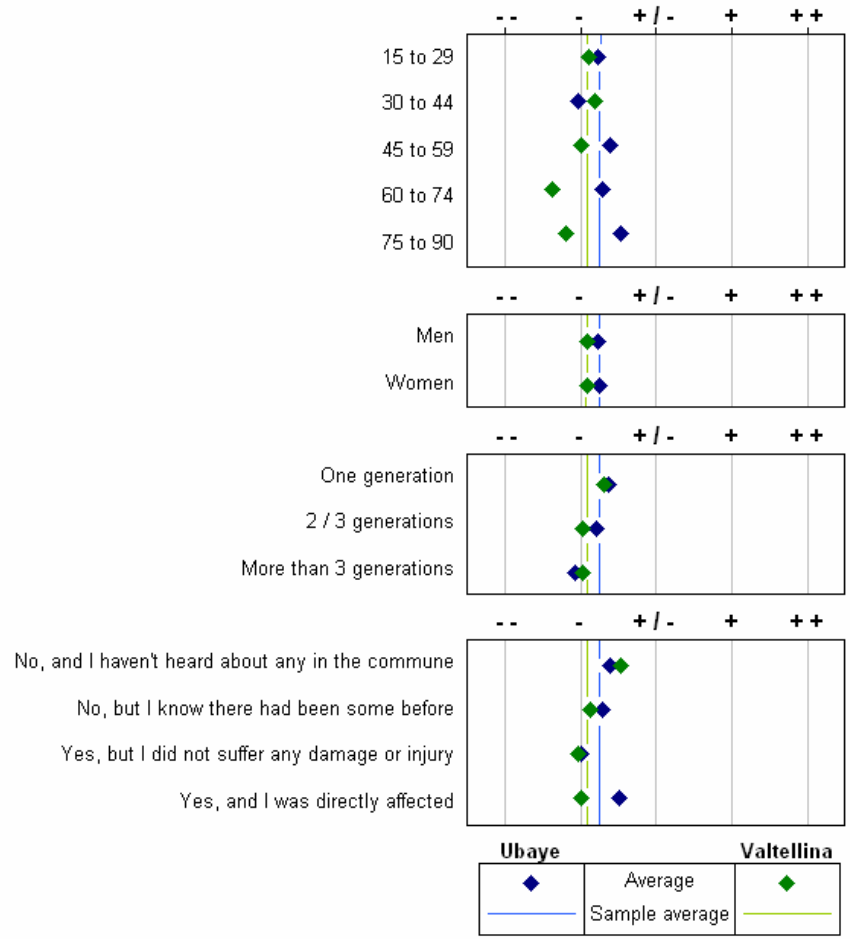

Estimated level of knowledge of the municipality
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average
Estimated level of knowledge of the CCVU / CMT
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average


Estimated level of knowledge of the département / provincia
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average
Estimated level of knowledge of the région / regione
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average

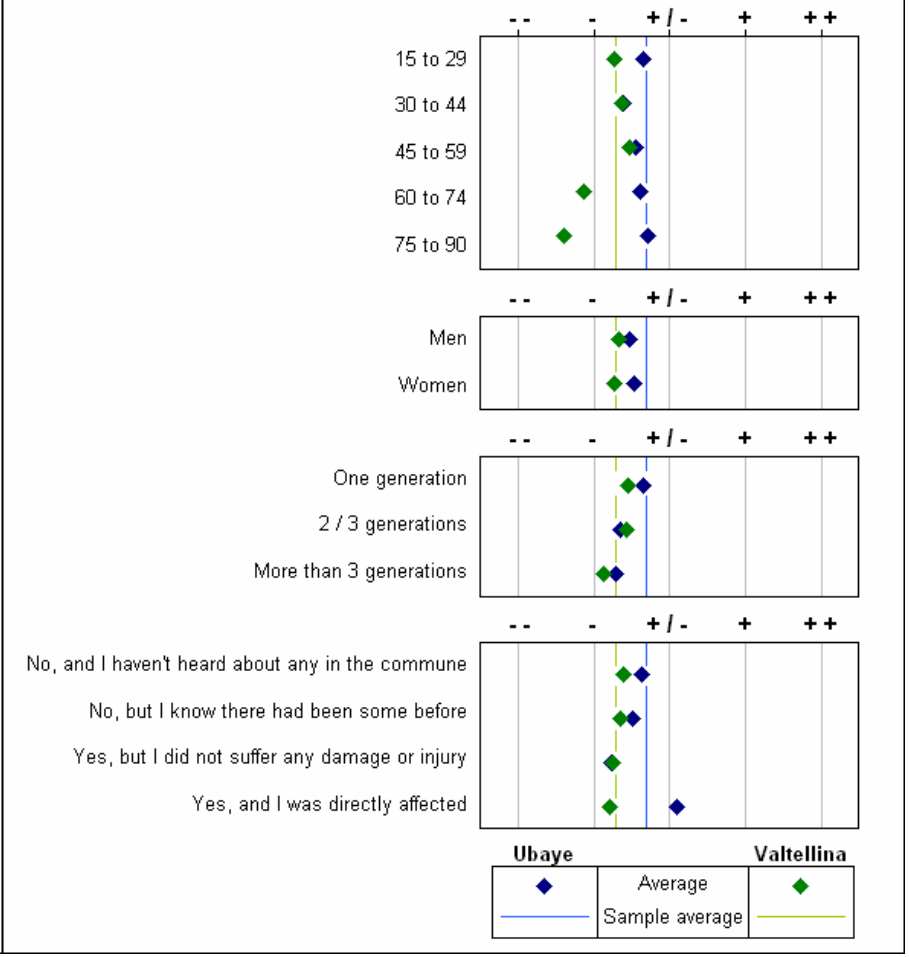

Estimated level of knowledge of the state
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average


Estimated level of knowledge of civil protection
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average

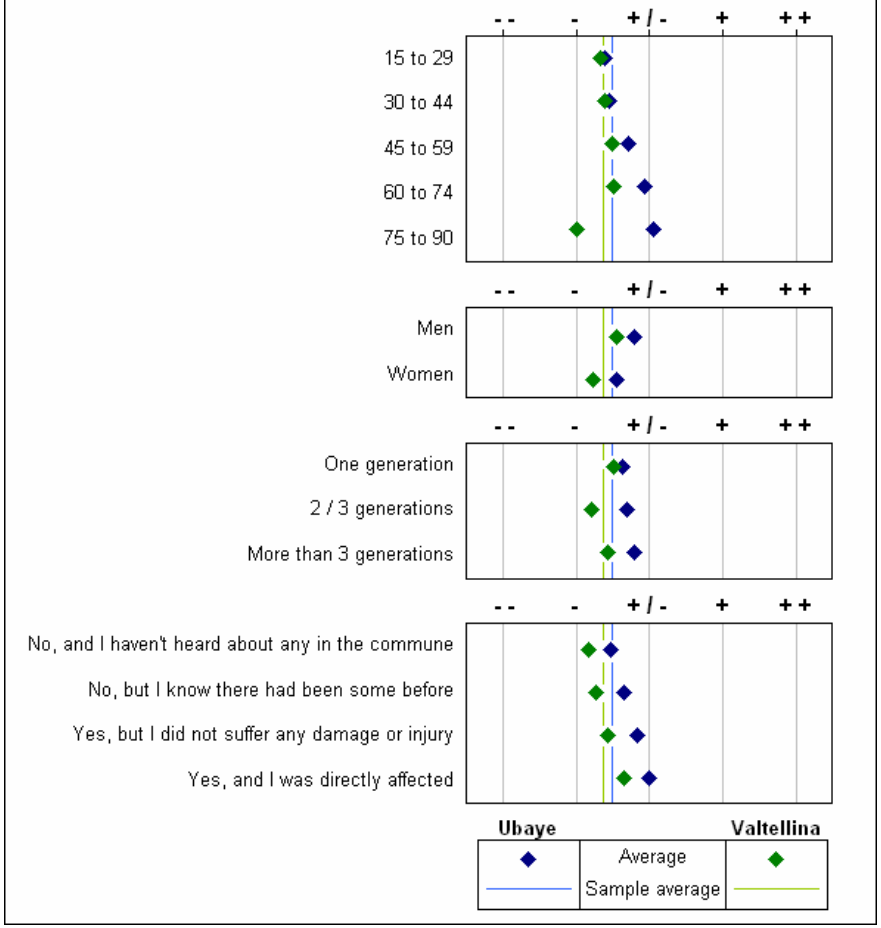
Estimated level of knowledge of the media



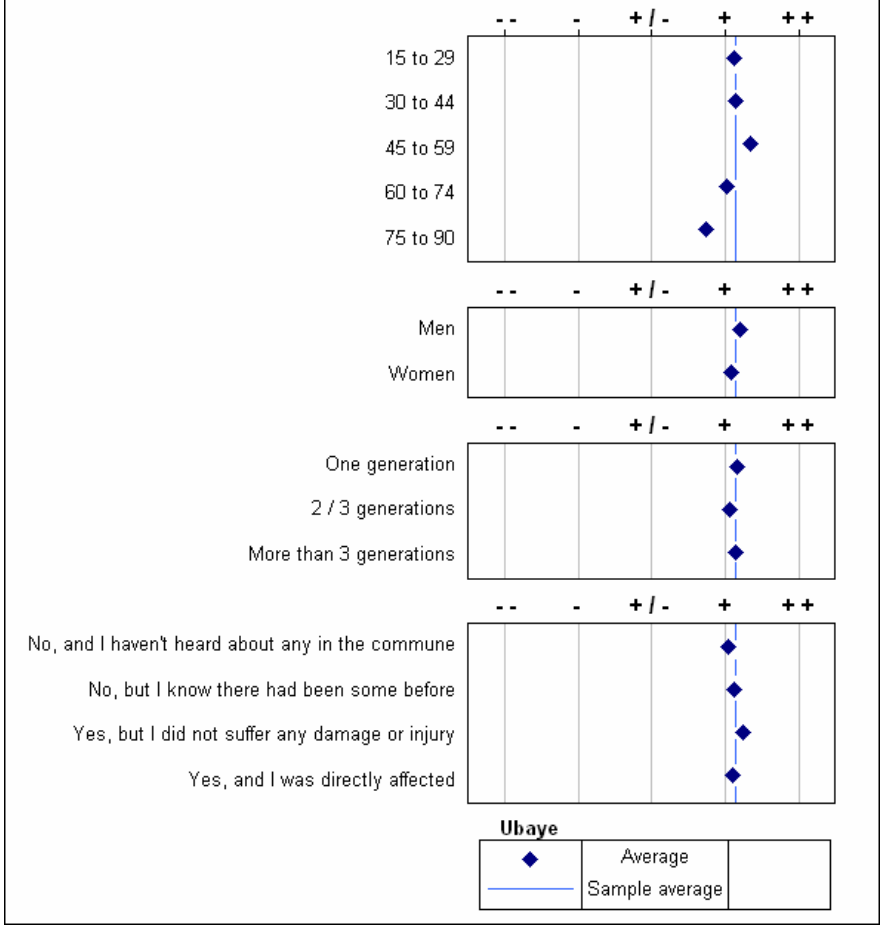
Estimated level of knowledge of insurances companies



Estimated level of knowledge of their own family



Estimated level of knowledge of RTM services

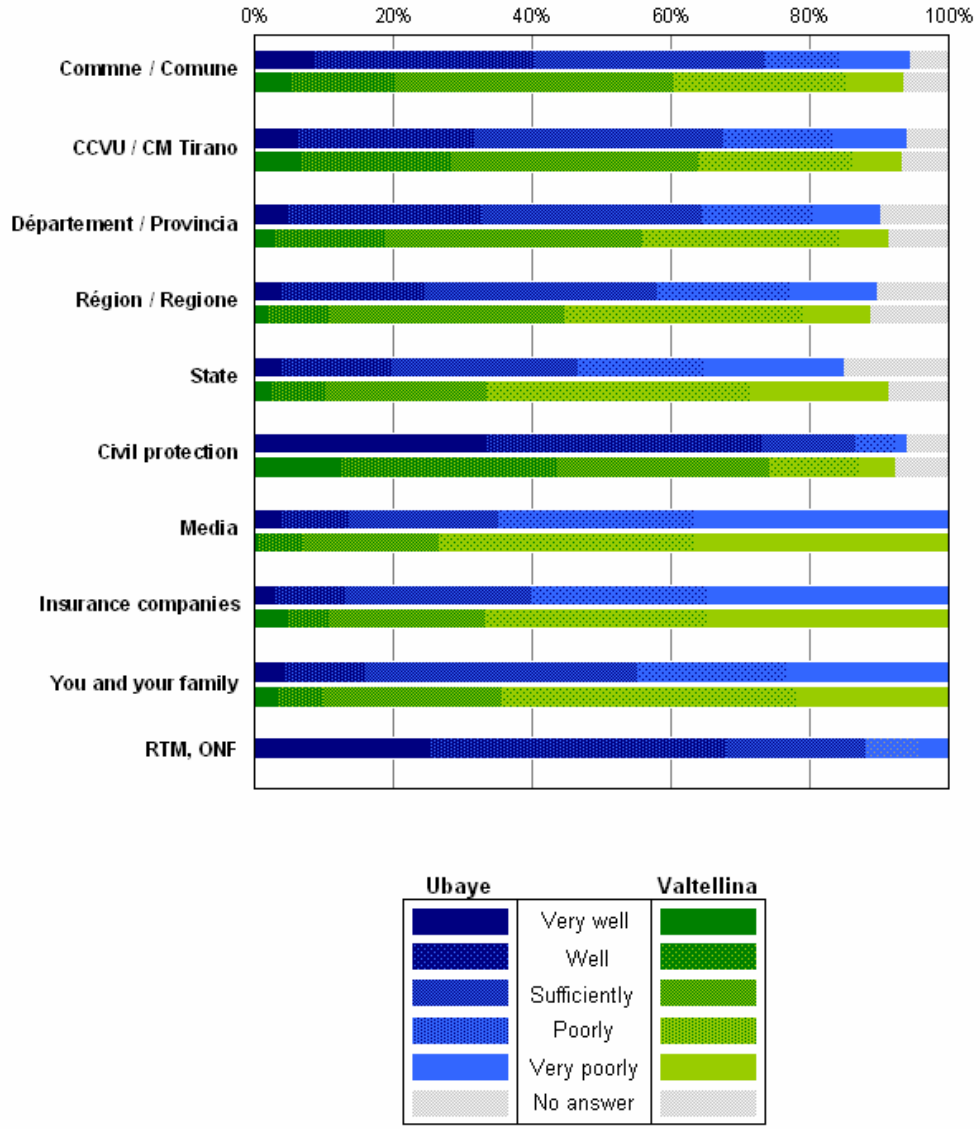


Question: How well do you think these actors are prepared to react in case of a crisis?

++	Very well
+	Well
+/-	Sufficiently
-	Poorly
--	Very poorly
#	No answer

		Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Civil Protection	Mass media	Insurance companies	You	RTM, ONF
	Ubaye										
++	**Very well**	9%	6%	4%	3%	3%	33%	3%	3%	4%	22%
+	**Well**	32%	26%	28%	21%	17%	40%	8%	9%	11%	38%
+/-	**Sufficiently**	33%	36%	32%	34%	27%	13%	18%	23%	36%	18%
-	**Poorly**	11%	16%	16%	19%	18%	6%	25%	22%	20%	7%
--	**Very poorly**	10%	10%	9%	12%	20%	1%	31%	30%	21%	4%
#	**No answer**	6%	6%	10%	10%	15%	6%	15%	14%	8%	11%
	Valtellina										
++	**Very well**	5%	6%	2%	2%	2%	12%	0%	4%	3%	-
+	**Well**	15%	22%	17%	9%	8%	32%	4%	5%	6%	-
+/-	**Sufficiently**	40%	35%	37%	34%	23%	30%	18%	20%	23%	-
-	**Poorly**	25%	23%	29%	35%	38%	13%	34%	29%	39%	-
--	**Very poorly**	8%	7%	7%	12%	20%	5%	34%	31%	20%	-
#	**No answer**	7%	7%	9%	11%	9%	8%	7%	10%	9%	-

How well do you think these actors are prepared to react in case of a crisis?



Crossing this question with age

		Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Civil Protection	Mass media	Insurance companies	You	RTM, ONF
		Ubaye									
Age group	**Sample**	3,19	3,01	3,03	2,83	2,59	4,04	2,16	2,22	2,52	3,77
	15 to 29	3,31	3,17	3,26	2,89	2,62	4,17	2,14	2,46	2,53	3,89
	30 to 44	2,83	2,67	2,82	2,67	2,60	4,05	2,02	2,11	2,34	3,62
	45 to 59	3,26	3,11	3,02	2,82	2,63	4,04	2,22	2,19	2,49	3,92
	60 to 74	3,26	3,02	3,00	2,84	2,52	3,93	2,16	2,19	2,67	3,69
	75 to 89	3,68	3,48	3,48	3,24	2,43	4,20	2,50	2,53	2,96	3,76
	90 and +	4,00	4,00	4,00	4,00	4,00	4,00	4,00	-	1,00	4,00
		Valtellina									
Age group	**Sample**	2,83	2,99	2,78	2,50	2,29	3,35	1,93	2,14	2,27	-
	15 to 29	2,84	3,10	2,82	2,54	2,32	3,31	1,93	2,13	2,24	-
	30 to 44	2,88	2,98	2,82	2,57	2,35	3,42	2,18	2,41	2,38	-
	45 to 59	2,73	2,69	2,73	2,51	2,30	3,40	1,82	2,09	2,35	-
	60 to 74	3,00	2,75	2,31	1,83	1,64	3,33	1,75	1,86	2,44	-
	75 to 89	3,33	2,83	2,17	1,50	1,33	3,83	1,40	1,20	1,50	-
	90 and +	-	-	-	-	-	-	-	-	-	-

Crossing this question with gender

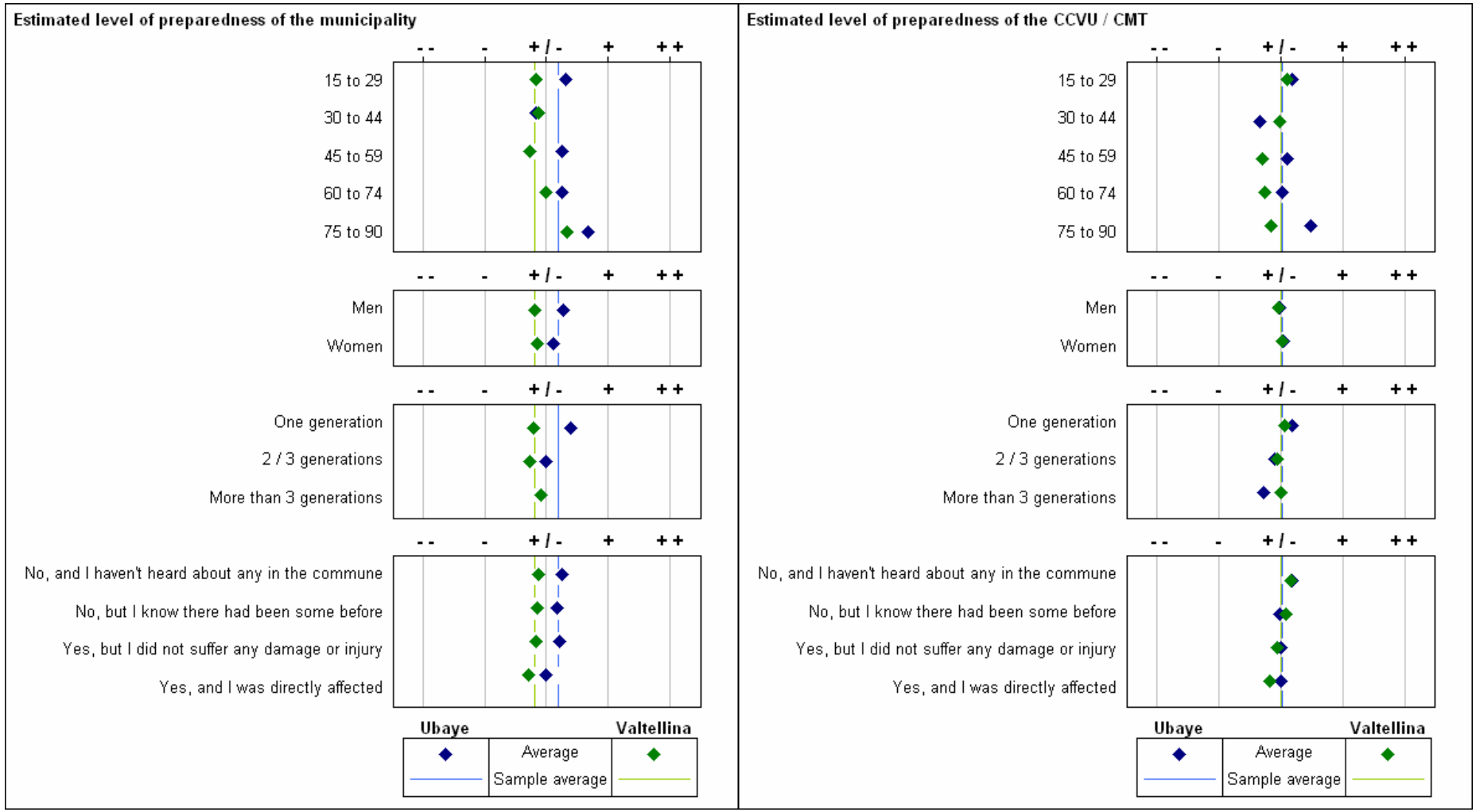
		Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Civil Protection	Mass media	Insurance companies	You	RTM, ONF
	Ubaye										
Gender	**Sample**	3,19	3,01	3,03	2,83	2,59	4,04	2,16	2,22	2,52	3,77
	Men	3,26	2,98	3,05	2,82	2,60	4,06	2,12	2,22	2,72	3,81
	Women	3,10	3,04	2,99	2,83	2,57	4,01	2,21	2,21	2,30	3,72
	Valtellina										
Gender	**Sample**	2,83	2,99	2,78	2,50	2,29	3,35	1,93	2,14	2,27	-
	Men	2,82	2,96	2,77	2,49	2,26	3,39	1,87	2,13	2,51	
	Women	2,85	3,02	2,79	2,51	2,30	3,32	1,98	2,15	2,11	

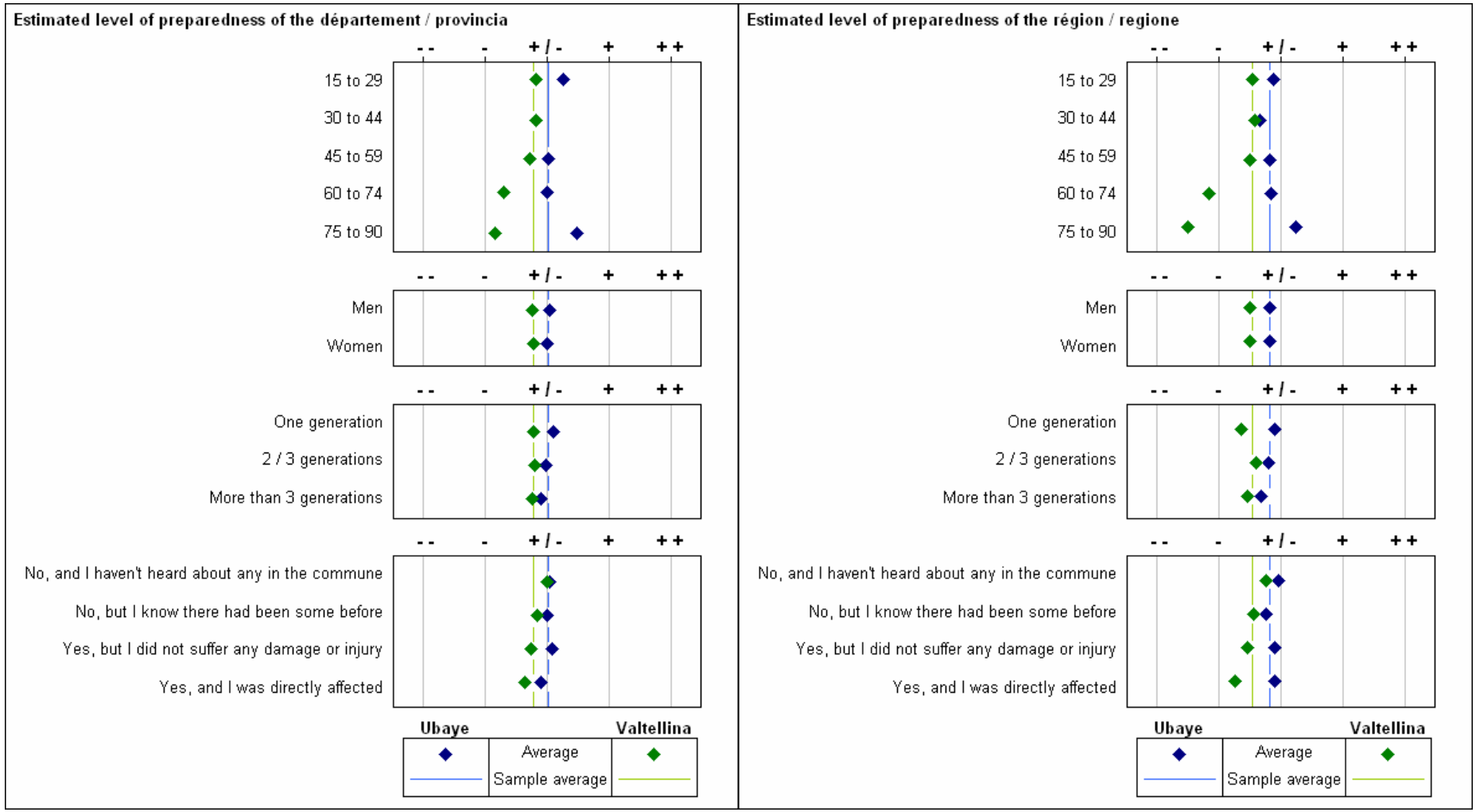
Crossing this question with ancientness in the valley (in generations)

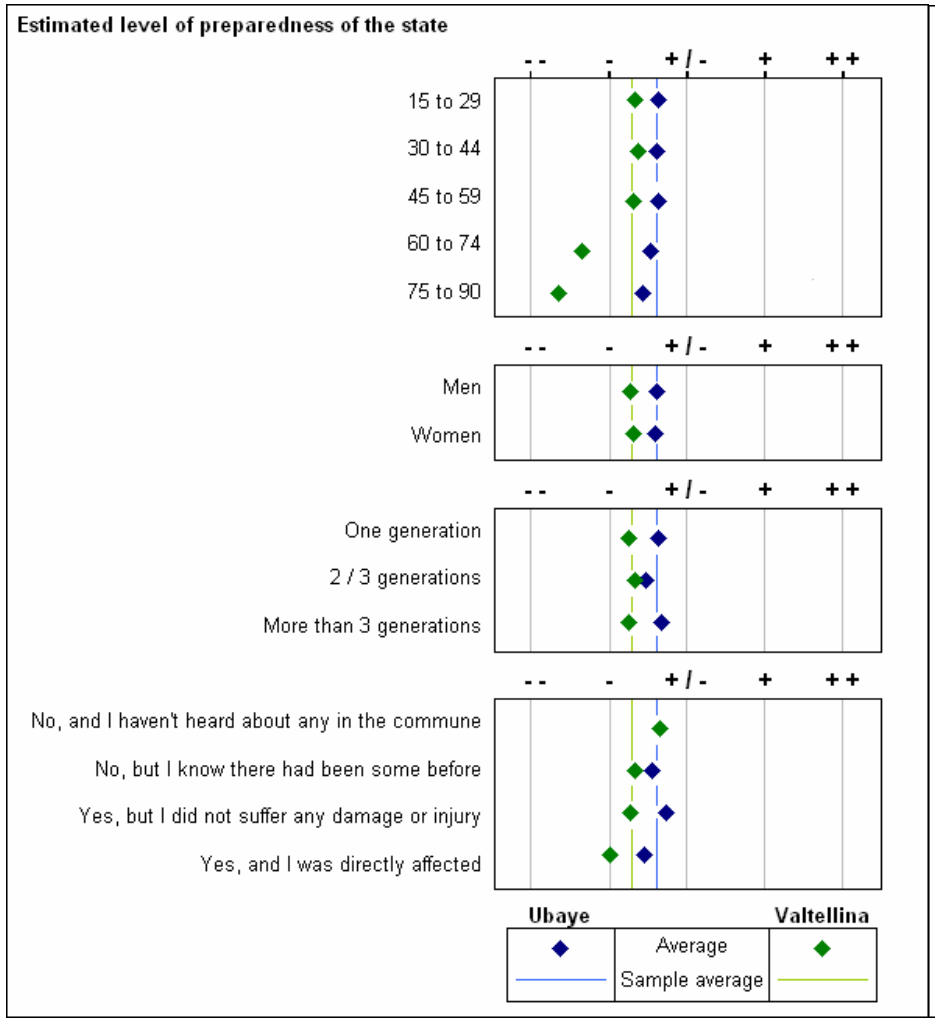
Ancientness	Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Civil Protection	Mass media	Insurance companies	You	RTM, ONF
Ubaye										
Sample	3,19	3,01	3,03	2,83	2,59	4,04	2,16	2,22	2,52	3,77
One generation	3,38	3,18	3,10	2,91	2,62	4,14	2,28	2,30	2,51	3,79
Two or three generations	2,99	2,90	2,97	2,79	2,45	4,00	2,17	2,14	2,51	3,75
More than three generations	2,91	2,72	2,90	2,68	2,66	3,81	1,86	2,13	2,58	3,72
Valtellina										
Sample	2,83	2,99	2,78	2,50	2,29	3,35	1,93	2,14	2,27	-
One generation	2,79	3,05	2,78	2,36	2,23	3,18	2,07	2,29	2,23	-
Two or three generations	2,73	2,94	2,79	2,60	2,32	3,43	2,00	2,20	2,27	-
More than three generations	2,91	3,00	2,76	2,45	2,24	3,34	1,81	2,03	2,30	-

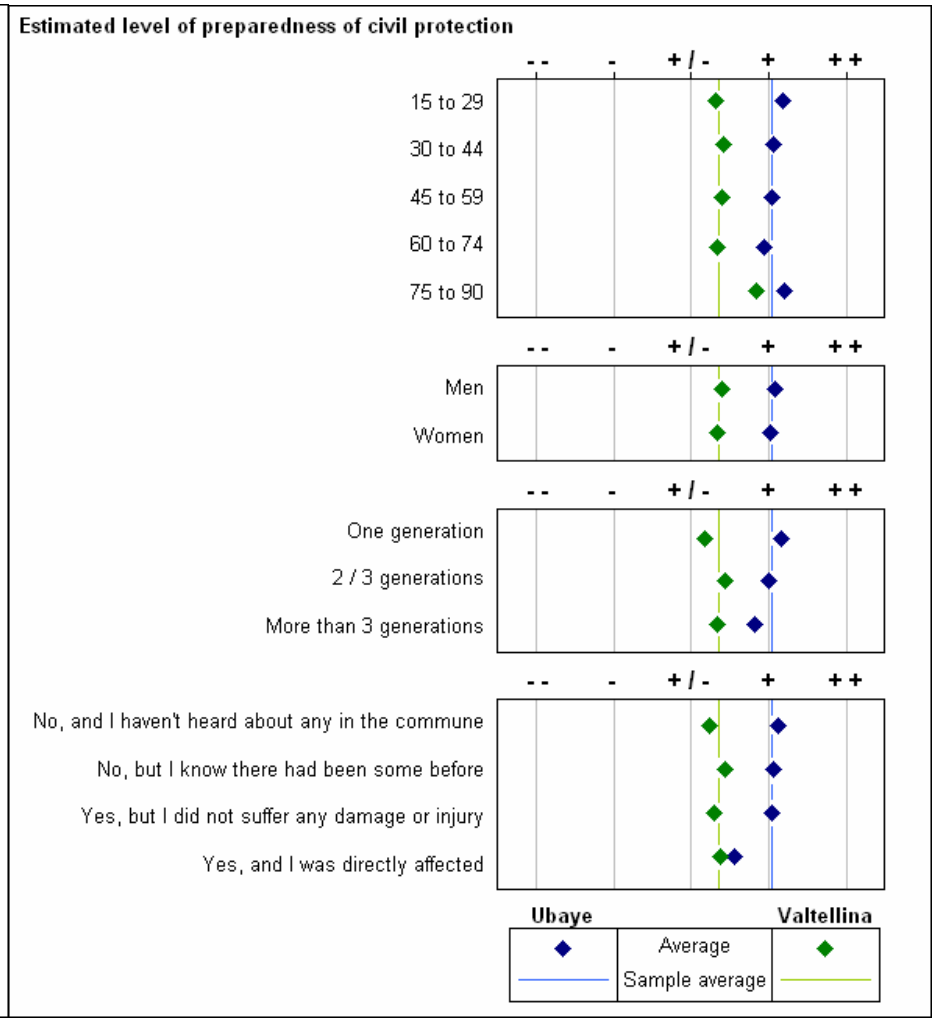
Crossing this question with former experiences with natural disasters

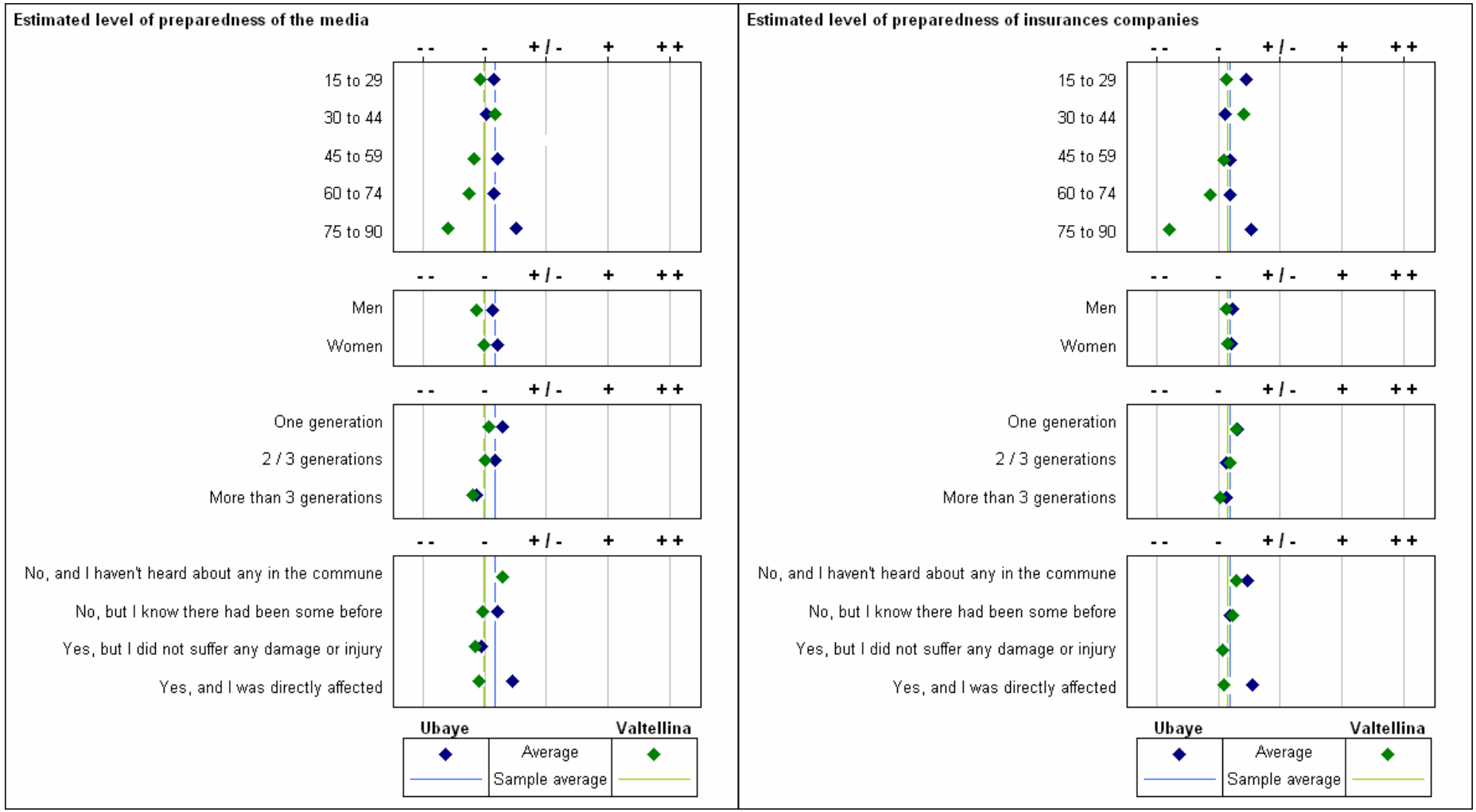
Experience with disaster	Commune / Comune	CCVU / CM Tirano	Département / Provincia	Région / Regione	State	Civil Protection	Mass media	Insurance companies	You	RTM, ONF
Ubaye										
Sample	3,19	3,01	3,03	2,83	2,59	4,04	2,16	2,22	2,52	3,77
No, and I haven't heard about any in the commune	3,26	3,18	3,04	2,96	2,64	4,11	2,29	2,47	2,29	3,86
No, but I know there had been some before	3,16	2,97	3,01	2,76	2,53	4,06	2,20	2,18	2,47	3,74
Yes, but I didn't suffer any damage or injury	3,22	3,00	3,08	2,90	2,72	4,04	1,95	2,06	2,76	3,83
Yes, and I was directly affected	3,00	3,00	2,90	2,90	2,44	3,55	2,44	2,55	2,91	3,55
Valtellina										
Sample	2,83	2,99	2,78	2,50	2,29	3,35	1,93	2,14	2,27	-
No, and I haven't heard about any in the commune	2,87	3,15	3,00	2,77	2,64	3,23	2,28	2,28	2,33	-
No, but I know there had been some before	2,86	3,08	2,84	2,56	2,31	3,44	1,97	2,23	2,22	-
Yes, but I didn't suffer any damage or injury	2,84	2,93	2,73	2,46	2,26	3,30	1,85	2,06	2,33	-
Yes, and I was directly affected	2,71	2,83	2,65	2,26	2,00	3,37	1,91	2,09	2,29	-

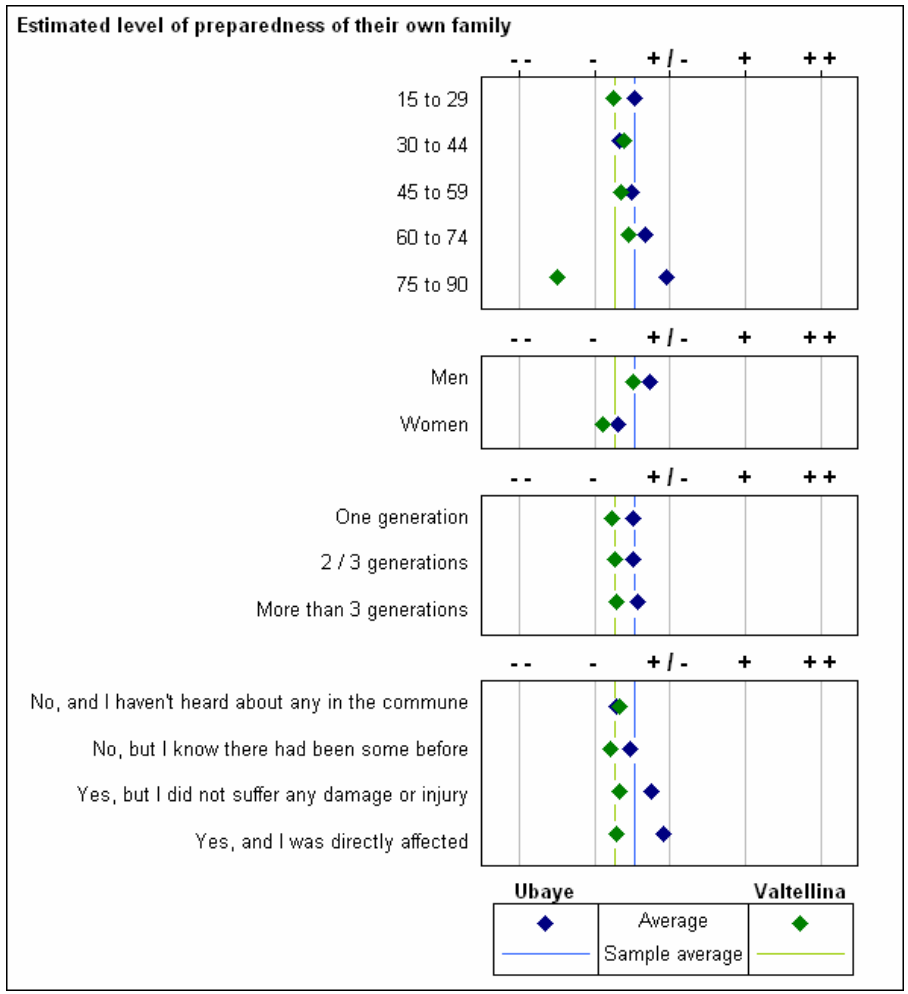

Estimated level of preparedness of the municipality
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average
Estimated level of preparedness of the CCVU / CMT

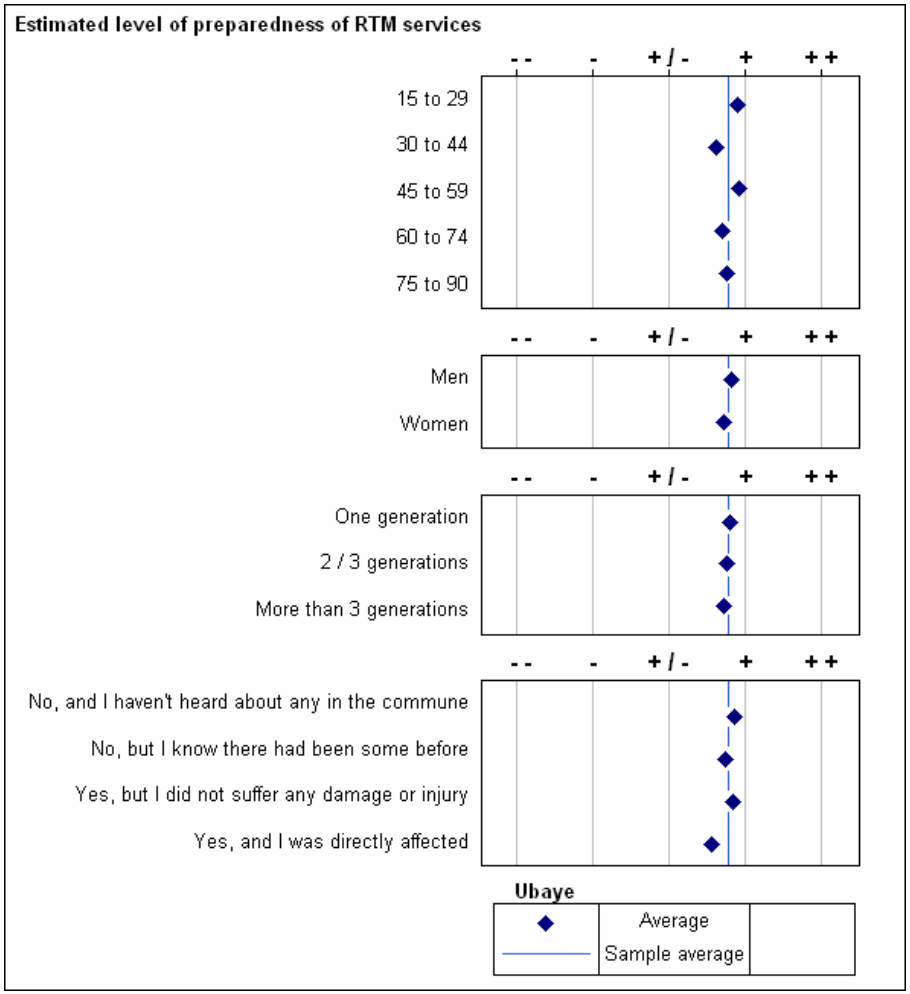

Estimated level of preparedness of the département / provincia
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average
Estimated level of preparedness of the région / regione
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average


Estimated level of preparedness of the state
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average


Estimated level of preparedness of civil protection
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average

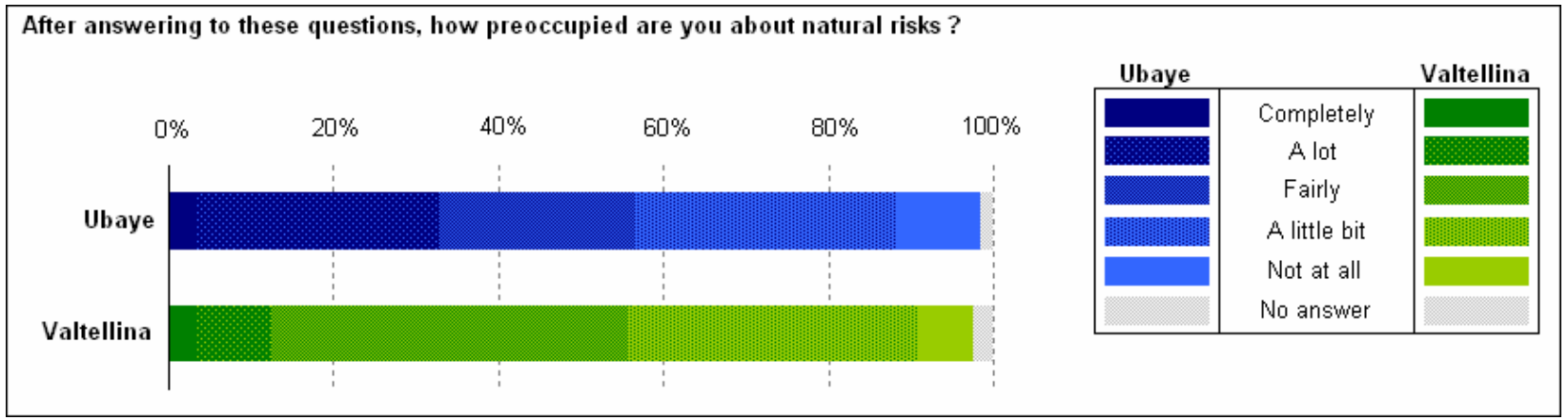

Estimated level of preparedness of the media
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average
Estimated level of preparedness of insurances companies
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average


Estimated level of preparedness of their own family
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Valtellina
Average
Sample average


Estimated level of preparedness of RTM services
- -
-
+ / -
+
+ +
15 to 29
30 to 44
45 to 59
60 to 74
75 to 90
Men
Women
One generation
2 / 3 generations
More than 3 generations
No, and I haven't heard about any in the commune
No, but I know there had been some before
Yes, but I did not suffer any damage or injury
Yes, and I was directly affected
Ubaye
Average
Sample average

Question: After answering to this questionnaire, how preoccupied are you about natural hazards in your community?

Concern about natural risks			Ubaye		Valtellina	
	++	Completely	12	3%	17	4%
	+	A lot	101	29%	43	9%
	+/-	Fairly	82	24%	210	43%
	-	A little bit	109	32%	170	35%
	--	Not at all	35	10%	31	6%
	#	No answer	5	1%	12	2%
		Total	344	100%	483	100%



Crossing this question with the initial level of concern

	Ubaye		Valtellina	
Initial level > final level (less concerned after the questionnaire)	128	37%	140	29%
Initial level = final level	114	33%	272	56%
Initial level < final level (more concerned after the questionnaire)	88	26%	55	11%
Incomplete / no answer	14	4%	16	3%
Total	344	100%	483	100%


management
knowledge
information
disaster
indices
process
european
assessment
hazard
public
question
planning
governance
risk
people
trust
area
authorities
vulnerability
study
local
communication
level
hazards
floods
natural
countries
comparison
group
europe
ubaye
different
respondents
decision
answers
landslides
important
spatial
valtellina