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Local Risk Awareness and Precautionary Behaviour in a Multi-Hazard Region of North Morocco.

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Abstract

North Morocco (region Tangier-Tetouan-Al Hoceima) is characterized by high demographic and economic pressures, which intensify the vulnerability of the coastal areas. Morocco lies both along the Atlantic and the Mediterranean coast, having a rich relief of mountain chains (Atlas and Rif). This diverse context induces the challenge of adapting to environments that are drastically different, and of answering the question to which extent the local population is aware of different natural risks. Risk awareness is addressed as a predictor of precautionary behaviour in a questionnaire-based survey. Here the variables explaining the readiness of inhabitants to protect themselves and their belongings from natural risks in the present and the willingness to invest and to protect in the future are explored. Furthermore, based on the different response patterns in the survey, we used multiple correspondence analysis to identify profiles of typical dwellers. The results indicate local regional differences, where the Rif Mountain dwellers are more prone to protect themselves than the ones living in other parts of North Morocco. Finally, environmental identity indicates that the relationship with nature has an impact on risk awareness and precautionary behaviour. This study brings out information which could be useful for policy makers who should promote ecological concerns and encourage local action in resolving environmental issues when promoting risk mitigation measures.

1. *Introduction*

The Mediterranean basin is one of the cradles of civilisation that has always been an attractive migration hub. More than 500 million people are estimated to live nowadays in its bordering countries [1] and the Mediterranean coasts represent the most visited tourist spot in the world, with more than 330 million visitors in 2016 [2]. In the European suburbs, just on the other side of the Strait of Gibraltar, lies Morocco, a country that seems to offer a perfect example of the Mediterranean essence. The country has been praised since the medieval

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times, like Ibn Battūtah described it as "*the best of countries, for in it fruits are plentiful, and running water and nourishing food are never exhausted*" [4]. These beauties of Morocco attracted more than 10 million arrivals in 2017 [5].

The vulnerability of the region of North Morocco, which is exposed to the Strait of Gibraltar and to Europe, has however increased since the region became a big economic hub at the end of the 20th century. The region's vulnerability has its roots in the Rif Mountain, one of the most vulnerable Mediterranean domains when it comes to natural disasters [7], located on a seismically active zone [8], prone to landslides [9, 10], and soil erosion [6]; with the interior prone to drought, floods and flash floods [7], whereas Moroccan coastlines are highly exposed to climate change and sea-level rise consequences [11, 12]. Due to this context of multiple risks we can call the region of North Morocco a multi-risks zone.

Local communities were seen to creatively integrate scientific elements to their cultural understanding of risks, in ways that might either contribute to their protection or increase vulnerability. Since scientific information is transmitted from scientific to common-sense knowledge, it integrates culturally available elements so that individuals make active use of historical and cultural ideas when collectively responding to risks [16, 17]. More specifically the cultural specificities of North Morocco, where a strong government is allied with the omnipresence of the Muslim culture, compose a singular cultural setting [23] where vulnerability and risk preparedness are to this day ill understood.

This article analyses elements which are, today, effective to support individual and collective action for risk preparedness. By this means, a face-to-face questionnaire-based survey of the general population in North Morocco was conducted. While cultural differences involved in risk perception and management are acknowledged [17], a description of the relations between risk awareness and precautionary behaviour in North Morocco would constitute an important contribution to risk management and disaster mitigation in other understudied Mediterranean and world settings.

In the following sections the notions of risk perception, risk awareness, and social and physical settings of the studied region are introduced, followed by a description of the methodology and the description of variables explaining the actual and future protection measures that define the social profiles of the local population.

1.1. Risk perception, awareness and the social knowledge of natural risks

Through a long history of settlement in one place, communities become experienced in the dangers posed by their immediate surroundings. These local hazards have been continuously integrated in local cultures as a type of cultural inoculation process that is active at a collective level, enabling a better resilience of communities to naturally occurring hazards [13, 14, 15]. Social memory, myths and religious beliefs are mixed into common-sense knowledge that supports local people in their practices [19], and scientific information is translated into common-sense knowledge by integrating historical and cultural ideas, as a way of making scientific aspects contextually meaningful for local populations [16, 17].

Similarly, knowledge about risk undergoes the same process of 'translation' of scientific knowledge to common sense [20]. Eventually, the mismatch between scientific logic and its local appropriation for risk preparedness has been seen to contribute to the vulnerability of local populations to natural hazards [22, 48]. In addition, some cultures express fatalistic attitudes towards future hazard predictions, which prevent them from acting although they have direct experience with hazards [52]; some with a genealogical or economic place attachment prepare for hazardous events [59]; sometimes the financial preparedness and insurance strengthen the sense of security, but weaken the sense of caution when it comes to encountering hazards [53]. Finally, there are other demographic and social variables that have a role in the final decision-making of taking precautions or not (such as gender, marital status, kids, age and education) [55].

A leading role in an efficient risk management is not only played by knowledge, but equally by risk perception. Risk perception is associated with risk knowledge but has been described as exposed to several different subjective logics [76]. More precisely, risk perception denotes the intuitive or subjective judgments of risks by the general public [51]. The concept of risk perception proposes that non-expert people might perceive risks by resorting to different logics than experts do [58], making the process of risk appropriation complex. Following these sometimes distorted images of risk, people who perceive a relatively *high* risk are more prone to taking some personal measures of precaution and supporting governmental plans [40]. Moreover, a previous hazard experience usually relates positively to risk perception [51].

Another similar yet distinct concept is *risk awareness,* which can be improved by understanding risk cultures in different settings [77]. If risk perception could be described as related to a 'conceptual understanding' of threat, risk awareness could be associated to information, knowledge and participation in risk information sessions [64, 65]. Nevertheless, while some authors do not seem to strictly distinguish between risk perception and risk awareness in their research [74], others consider awareness to be just one of the components to measure risk perception [75].

Come what may, it is not always the case that high-risk perception provokes protective actions or precautionary behaviour [21], and similar appears to be true for risk awareness. A comparative study has shown that high seismic risk awareness was not translated into human behaviour in the USA, Japan and Turkey [24]. Likewise, in the Costa Rican study on climate change and floods, the impact of risk perception on risk awareness was detected, but did not result in the adoption of disaster risk reduction measures [73]. Furthermore, it seems that taking actions based on risk awareness could be particularly critical in a multi-hazards setting [54].

Risk awareness has been globally investigated in relation to tsunamis, and it is confirmed to have grown after both the disastrous 2004 Indian Ocean and 2011 Tohoku earthquakes and tsunamis [69]. While horizontally comparing Japan, Chile and Indonesia, the authors named the lack of awareness and cultural issues as one of the key explanations for adequate tsunami response [68], confirming that risk awareness was related to education, local particularities and local and national policies [70]. In a recent tsunami awareness research in the same region, the authors underlined the peculiarity of the submarine landslide tsunami [71], and the awareness in low risk coastal community [72].

When it comes to recent studies from the Mediterranean region, risk perception and awareness including landslide perception [66] and multi-hazards perception [67] in South Italy were observed. In a recent Greek study, the authors showed that risk perception did not manage to explain the current level of preparedness, as it stated only the preparedness intentions. Nevertheless, it showed that variables describing risk awareness and confidence were indeed identified to impact flood precautionary behaviour [64]. In another Greek study, this time testing public risk perception of multi-hazards, the authors provided results according to which risk awareness and personal experience play a key role in risk perception, and found that awareness activities relate to a higher emergency response effectiveness [65].

1.2. Social and physical settings define the heterogeneity of the region of North Morocco

Morocco is partly geographically and entirely culturally immerged in the Mediterranean. Even though it has experienced natural hazards for centuries, its inhabitants have still managed to successfully occupy the area. Morocco is a traditional society, with the traditional forms of appropriation of space and the forms of its usage. People live and survive thanks to this territory, they are attached economically to it, and that is also the case for the region of North Morocco [61]. Moreover, Morocco is a Muslim society. In the study on perception of earthquake risk in Agadir, South Morocco, it was shown that both opinions and perceptions of seismic risk are less influenced by personal experience than by Muslim education, rituals and culture [27]. In the seismically active western Maghreb, it has been found that religious elements have prevented the assessment and implementation of risk management solutions [23].

The detected variables can contribute to risk reduction in the region of North Morocco, as an exemplary case study for other Mediterranean regions and beyond, whilst acknowledging the cultural differences [17] and testing for site-specific risk perception [18], in order to build an efficient disaster mitigation plan. Although the region of North Morocco, also named ‘Tangier-Tétouan-Al Hoceima’, was territorially depicted only in 2015 [35], it is a consistently religious and traditional region, where many local heterogeneities can be spotted. It is composed of three areas with different geographical and physical characteristics, whereby the East zone has different cultural and historical background and is inhabited by the ethnic group Amazigh. These areas also experienced different historical hazard events. It is precisely these natural particularities that are the base of our test, considering at the same time other local variations in our analysis, as well. Physically, the geography of North Morocco is composed of three main domains: the Atlantic coast, the Mediterranean coast and river valleys (among others the most important Martil River) and the Rif Mountains.

The Atlantic coast, including provinces of Tangier and Larache, suffered a tsunami resulting from an earthquake of the magnitude 8.5+, the so-called Lisbon earthquake (1st November 1755). Other tsunamis were also observed in 1941 and 1969, but without such disastrous consequences. This coastline is highly vulnerable to such natural hazards since Tangier is the second economic centre and the third biggest city of Morocco with approximately 950.000

residents (2014 census), whose coastal infrastructure is undergoing a significant economic (harbour) and tourism (marina, beach, hotels, resorts) development [25] (Figure 1a). One example of the Moroccan economic growth is the project of Tanger-Med port, which brought not only construction work and increased employment, but also anarchic settlements and brand-new environmental issues arising from the rubble freshly excavated from the port, as well as landslides and water issues [6].

Figure 1a: The harbour development of Tangier, with hotels, restaurants and the marina.

The Mediterranean coast of Tetouan is one of the coastal areas that have rapidly been urbanized in Morocco. Because of an erosive shoreline, the direct exposure of coastal infrastructure to waves, sea level rise and marine storms, the Mediterranean coast with its high population density is strongly exposed to climate change and to the consequences of natural hazards [11, 12]. The area is little fed with fluvial inputs. With a catchment area of 1220 km², the seasonal river or wadi Martil is the most important sedimentary source, whose hydrological regime is that of recurrent flash floods [11, 26] (Figure 1b).

Figure 1b: Construction site of wadi of Martil floodplain in Tetouan.

The Rif Mountains are also very vulnerable to natural hazards. Due to natural predispositions of hills, a barely consolidated flysch lithology is prone to landslides [9, 10]. Moreover, many forest surfaces of the region were converted to agricultural parcels, leading to amplified soil erosion [6]. Since it is located at the transition between a Mediterranean climate with oceanic influence to the North, and a more arid climate to the South, the interior of Morocco is also prone to drought, floods and flash floods, where periods of rain and drought alternate [7]. These are not the only worrying hazards, as the region is also located in a seismically active zone [8]. It experienced three earthquakes in a period of 22 years, with the 2004 notorious disaster of Al Hoceima earthquake (magnitude 6.4). Together with the adjacent Gulf of Cadiz and the Alboran Sea, this region hosts most of the Moroccan seismicity and belongs to the diffuse plate boundary between the Nubian and Eurasian plate [8]. Indeed, the relatively superficial nature of the seismicity combined with weak ground mechanical properties led to significant damages on constructions that do not always respect building standards [49] (Figure 1c).

Figure 1c: The construction sites in Al Hoceima, exposed to landslides, flash floods and seismic risk.

1.3. Summary and goals

Risks are socially constructed and depend on the physical and cultural uniqueness of territories. In order to improve risk assessment and to strengthen the societal resilience, mitigation plans must focus on the individual experience of local dwellers at some point. The social knowledge about their own territory and the local appropriation of natural hazards are of utmost importance for the citizens' preparedness to future changes. Since local populations have coped with different natural hazards for many centuries, we must better explore and understand what the key variables that impact local risk awareness and precautionary behaviour are.

Although a lot is already known about the situation in Europe or North America, there is a lack of studies on precautionary risk behaviour in developing countries. North Africa, and particularly North Morocco, presents a perfect region for a study of local awareness of multi-hazards in a particular social and cultural setting. Taking everything into consideration, we analyse what sort of elements pertaining to individuals' risk awareness are associated with individual and collective action for risk preparedness. In order to determine which variables contribute to the awareness of risk and its local distribution within the region, this study was undertaken with the following research questions:

1. What are the variables explaining the existing *readiness to protect themselves and their belongings facing natural hazards* in the social and cultural setting of North Morocco?

2. What are the variables explaining the future *willingness to invest for protection* and to implement *protection measures*?

3. Are these characteristics associated with specific social profiles among the respondents of the region?

This study contributes to explaining risk preparedness related to natural risks by describing the relations between risk awareness and precautionary behaviour in North Morocco. It explores the role of key variables (social trust, place attachment, environmental identity, risk awareness) in explaining individual present and future precautionary behaviour.

2. Methodology

Participants and fieldwork procedure

Three-hundred-and-ninety-one inhabitants of the region North Morocco from eight different municipalities responded to the questionnaire in a public setting (Figure 2). The chosen municipalities belong to three areas of study (Figure 2) with different geographical, cultural and social characteristics, and with a different historical hazards record.

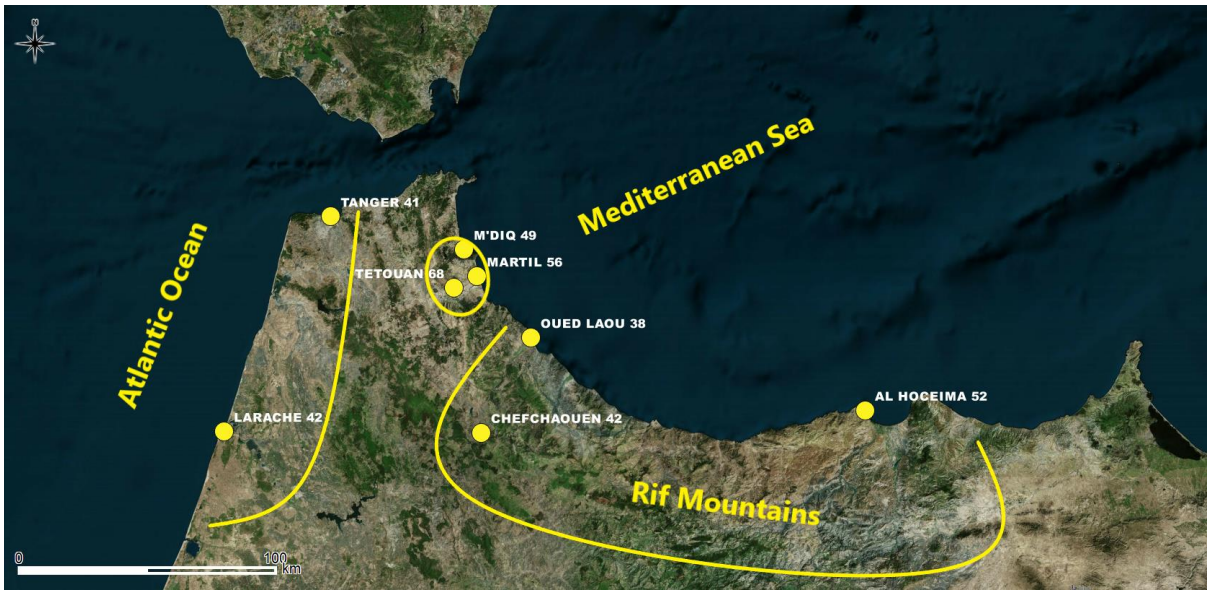

Figure 2: North Morocco with three main sub zones of the Atlantic coast (Tangier /41/ and Larache /42/), Mediterranean-Martil (Tetouan /68/, Martil /56/, M'Diq /49/) and Rif (Al Hoceima /52/, Chefchaouen /42/, Oued Laou /38/). Numbers in brackets indicate the number of questionnaires conducted per municipality.

This questionnaire-based survey was conducted in North Morocco during November 2018. Data were collected face-to-face, by targeting general population. Four native speakers were randomly approaching possible participants, paying attention to the equal gender

representation. The only criterion asked before starting the questionnaire was if the respondents had been living in the municipality for at least last five years. Additionally, only those over the age of eighteen years (age of majority) were asked to proceed with the questionnaire. Moreover, one constraint was the fact that women were not open to participating in the survey, although there was a girl in our team who was precisely targeting women and convincing them to take part. Finally, more educated people were more likely to dedicate their time to answering the survey, although our pollsters were coming from and were mainly targeting the working-class area. The working class seemed to be less attracted by responding to the questionnaire during their working hours possibly because it was rather time-consuming (around 20 min were needed to complete the survey), so there we encountered some withdrawal.

The obtained sample is composed of 44.2% female and 55.8% male respondents and thus underestimates female population (who is represented on the national level with 50.37%[6]). The respondents belong on average to a 36-41 year-old class (which overestimates the fact that Morocco is a young nation with a median age of 29.5 years[2]), on average they live with four other members in their household, they live mainly in a working-class area of the municipality (42.8%) and are predominantly born in the municipality of study (51.7%). In addition, our sample is too educated compared to the national level, since our respondents have mainly declared either a high school level education or a bachelor's degree (50.4%), with the enrolment rate in higher education in Morocco being that of 28.14%[7]

Survey content

The questionnaire consisted of 39 questions divided in five sections. The first section dealt with risk awareness. It started with an open-ended question asking respondents to name up to five natural hazards that come to their minds with regard to their municipalities provided that they are acquainted with that hazard. Questions about personal risk experience, formal and informal education on risks and risk awareness sessions followed. In the second section participants were asked about sources of information, with questions testing for trust the respondents have in science in general, in scientists, media, public and private research institutes that take part in risk management, and finally in the government. The next block of questions was related to climate change, to belief and knowledge respondents have about that phenomenon. Fourthly, questions related to attachment to their municipality, adopting precautionary measures and investing money were posed, followed by the demographic section. The types of questions asked were both open-ended (the first question) and close-ended questions (dichotomous and Likert rating scale). The full questionnaire (original in French, translated into Arabic) is available upon request. However, it is to underline that not all questions from the questionnaire were used in this analysis.

[6] https://www.worldometers.info/world-population/morocco-population/ (online access 6 January 2020)

[7] https://www.moroccodemia.com/en/key-figures-on-higher-education-in-morocco/ (online access 6 January 2020)

Analysis

The data were firstly described in order to get an initial view of the population from the region of interest. A basic description was done in Excel and the subsequent analysis (correlations, regression models, factor analysis and multidimensional analysis) was executed using SPSS software (Version 22.0). Correlations between key variables were tested using Spearman's correlation test since the data did not follow normal distribution. The regression models used were binary logistic models since they permit both binary and continuous data jointly, dividing variables into more blocks, which allows tracing the model's improvement by adding new variables. Finally, data were summarized using a Multiple Correspondence Analysis, using binary variables to identify social groups, in order to better understand how natural hazards are perceived by different social groups and to identify groups more or less vulnerable to natural hazards that the region of study is prone to experience.

The first set of variables used in regression models is related to demographic data, all of them used as binary variables: age (with value 1 for those over the age of 36), gender (value 1 for female), education (value 1 for those with a level of education corresponding to a bachelor's degree or higher), and zone of residence (three dummies for three geographical zones). The second set of variables was related to risk awareness and experience with risks, whereas the third set was related to additional variables that could have a role in the risk mitigation process: place attachment, environmental identity, social trust and willingness to move out. Those data are presented as follows.

Risk awareness

Risk awareness was tested using questions relating to how much the respondents considered themselves informed about natural hazards in their region in general, and specifically for each of the natural hazards listed (on the Likert scale from 1 to 5) and whether they participated or not in the awareness sessions or environmental education campaigns organized by the municipalities or associations, as in [29].

The items used in defining indicators that describe the risk awareness level are based on the ratings which respondents used to express their level of information about eight natural hazards (drought, flood, land movement, coastal storm, heat wave, earthquake, coastal erosion and wildfire), and about climate change, as well as based on a question of whether the respondents considered the origin of climate change to be natural or anthropogenic. The two final questions assessed the respondents' awareness of risk sessions taking place in their municipality, and explored whether the respondents were informed about possible solutions to protect themselves against natural risks. Items were submitted to a factor analysis (Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .897; Bartlett's test of sphericity: $\chi^2 = 1679$, $df = 55$, $p < .001$), and two factors were retained. One factor is about how much respondents consider themselves informed about risks, which is why it is called 'risk informed' (α = .890), and the other expresses whether the respondents took part in some risk divulgation sessions, named 'risk sessions' (α = .381). They were used as two indicators of risk awareness in the following analysis.

Personal experience of natural hazards

Additionally, the variable of personal experience of natural hazard (yes/no) could be of decisive importance when it comes to deciding whether to take or not to take precautionary measures to protect in the future, as well as to evacuate during future events such as floods or storms, since some territories are more prone to certain hazards than others [45]. For example, evidence is mixed for the case of previous experience with hurricane and its link with future evacuation behaviour, demonstrating previous experience as unrelated [46], or related [47] to future behaviour. As far as floods are concerned, there are numerous studies that show that the direct experience with a flood leaves the individual capable to better evaluate the probability that a similar event could occur in the future [50].

Place attachment

Although it is intuitive [30], we look at place attachment as an emotional tie that motivates a resident to maintain a relationship with a particular place [31]. There is evidence from a Portuguese study that place attachment reduces risk perception for risks perceived to be less likely [60]. As argued in an extensive review [32], people tend to rate environmental problems as more severe at the global than at the local level, and that was one of the questions that we asked in our questionnaire. Moreover, the authors found only two studies that show a lack of connection between place attachment and risk perception.

Place attachment was measured using a 5-point scale from 1 – *not at all* to 5 – *very much* proposed by [31], using five items: 'I am proud to live in this municipality', 'I think this municipality offers a good living environment', 'I identify with other residents of my municipality', 'I would regret to be obliged to move from my district', and 'I would regret to be obliged to move from my municipality'. These items were averaged to a single 'place attachment' indicator with a satisfactory consistency ($\alpha = .827$[8]).

Environmental identity

Environmental identity is measured (on Likert scale 1-5) to control the extent to which the residents recognize their environment as an important part of their personality, and to which respondents identify themselves with respect to environmental concerns. So far it has been demonstrated as an important predicting factor in studies related to recycling behaviour [33] and related to willingness to buy carbon offsets [34].

It was measured by two items [33]. The statements were: 'I think of myself as someone with ecological concerns' and 'I think of myself as someone engaged in environmental issues'. Participants rated the extent to which they agree with them and the answers were averaged into a single indicator of 'environmental identity' with good consistency ($\alpha = .846$).

Social trust

[8] Cronbach's alpha is a measure of internal consistency or scale reliability

Citizens must trust their representatives to evaluate how much of their hazard exposure they can or cannot manage on their own [36, 78]. People often include their personal evaluation of the credibility of the institutions involved in risk management [37], relying on them to provide information on many topics despite possible distrust [48]. Given the different spheres involved in risk-related decision-making, participants attribute trust/distrust (Likert scale 1-5) to a diversity of actors (such as institutes or government).
Items were then submitted to a factor analysis (Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .768; Bartlett's test of sphericity[9]: $\chi^2 = 1230, df = 21, p < .001$) [39], which split the items into two main dimensions: (1) items related to trust in science [38] and scientific institutions [33]; and (2) items related to trust in media, government, private and public institutes included in risk management. Items were then averaged into two indicators: 'trust science' ($\alpha = .887$) and 'trust state' ($\alpha = .804$).

The final two independent variables used in the analysis are the general feeling about the level of knowledge related to hazards and the assessment whether respondents think that moving out could help them to protect themselves against natural hazards (both on Likert scale 1-5).

Finally, the dependent variables in the regression analysis related to precautionary behaviour that were used are: the variable 'precautions' taken (the yes/no question if the respondents took some precautions to protect themselves), the variables 'protect future' (the yes/no question if the respondents were ready to protect their lives and belongings in the future, bearing in mind that this future protection is general and not necessarily directly financial) and 'invest money' (the yes/no question if the respondents were truly ready to invest money to protect themselves in the future). The full list of the 18 variables used in the analysis is presented in Table 1.

[9] Both measures are the standard that shows how suited data are for factor analysis.

Table 1: *The list of variables used in the analysis*

Variables	Description	Category	N obs.	Mean	St. Dev.	Min	Max
Gender	Demographic	Binary	391	.44	.497	0	1
Age	Demographic	Binary	389	.509	.501	0	1
Education (university degree)	Demographic	Binary	378	.376	.485	0	1
Zone Rif	Demographic	Binary	391	.34	.473	0	1
Zone Mediterranean Martil	Demographic	Binary	391	.45	.498	0	1
Zone Atlantic	Demographic	Binary	391	.21	.409	0	1
Personal Experience	Additional	Binary	390	.64	.482	0	1
Feeling How	Additional	Continuous	385	2.74	1.287	1	5
Risk Informed	Constructed	Binary	341	.4370	.49674	0	1
Risk Sessions	Constructed	Binary	341	.51	.50	0	1
Place Attachment	Constructed	Continuous	387	3.2729	1.14415	1	5
Environmental Identity	Constructed	Continuous	385	3.1948	1.36301	1	5
Trust Science	Constructed	Continuous	388	3.7908	1.10690	1	5
Trust State	Constructed	Continuous	388	2.5513	.96907	1	5
Moving Out	Additional	Continuous	380	2.17	1.600	1	5
Precautions	Dependent	Binary	382	.17	.374	0	1
Protect Future	Dependent	Binary	390	.51	.501	0	1
Invest Money	Dependent	Binary	385	.56	.497	0	1

3. Results

3.1. Main hazards locals are aware of are floods and earthquakes

Answers to the first, open-ended question of the questionnaire, asking respondents what are the five natural hazards related to their municipality that come to their minds indicate that the main natural hazards that most locals are aware of are floods (148 of 391 responses) and earthquakes (69 of 391 responses). Together they represent 55.5% of the first spontaneously named hazards in each municipality (Figure 3). They are also cumulatively the most cited natural hazards, followed by wildfires, landslides, droughts and coastal storms. The three most threatening hazards per municipality are presented in Table 2. Also, according to literature, floods and earthquakes are the major historical natural disasters in Morocco and in the region (Al Hoceima's earthquake in 2004 with 628 fatalities, Tangier's flood in 2008 with 30 fatalities) [62]. Hypothetically, floods and earthquakes could also be better recognized not just because there are higher in number, but because they are more striking or just more apparent than some other hazards (like droughts).

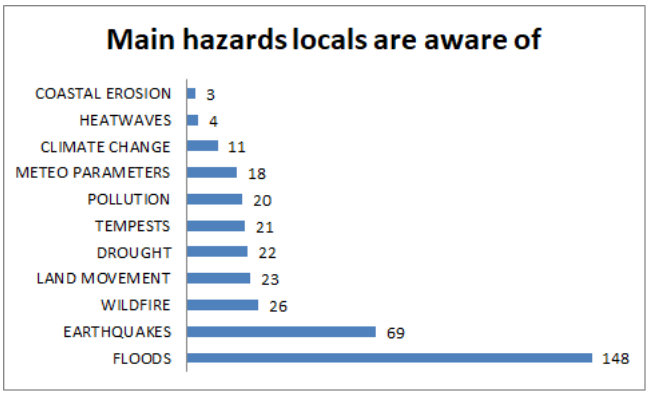

Figure 3: Main hazards locals are aware of: high dominance of floods and earthquakes in the region.

Table 2: *Top three most threatening natural hazards per municipality*

	First	N	%	Second	N	%	Third	N	%
Larache	Wildfires	24	20.3	Floods	19	16.1	Pollution	11	9.3
Tangier	Floods	31	37.8	Wildfires	14	17.1	Pollution, Coastal storms, Earthquakes	6	7.3
Tetouan	Floods	54	26.2	Earthquakes	31	15.0	Wildfires	29	14.1
M'Diq	Floods	39	36.4	Wildfires	13	12.1	Earthquakes, Extreme weather	7	6.5
Martil	Floods	37	29.6	Coastal storms	24	19.2	Earthquakes	16	12.8
Oued Laou	Floods	22	25.9	Coastal storms	10	11.8	Pollution	9	10.6
Chefchaouen	Landslides	24	21.2	Floods	22	19.5	Wildfires	16	14.2
Al Hoceima	Earthquakes	51	32.7	Drought	23	14.7	Floods	20	12.8

3.2. Correlations indicate the regional variability and the impact on precautionary behaviour

Table 3 presents the correlations between the proposed constructed indicators. Among them, only environmental identity and risk sessions show significant and positive correlations with precautions taken. Environmental identity is positively correlated with risk sessions and with place attachment. Place attachment is negatively correlated with risk sessions, and 'trust state' is positively correlated with 'risk sessions' and with 'trust science'.

Table 3: *Correlations between the six constructed indicators and the precautions taken*

	Nb items	*Risk Informed*	*Risk Sessions*	*Place Attachment*	*Trust Science*	*Trust State*	*Environmental Identity*	*Precautions*
Risk Informed	11	1.00						
Risk Sessions	2	-.010	1.00					
Place Attachment	5	.091	-.103**	1.00				
Trust Science	3	-.027	.015	.066	1.00			
Trust State	4	.024	.120*	.088	.321**	1.00		
Environmental Identity	2	-.081	.335**	.143**	.095	.091	1.00	
Precautions	1	-.014	.227**	.035	-.019	-.028	.111*	1.00

** with significance < .01 * with significance < .05

If we check the correlations of three different areas (binary variable for each area) of our study with the constructed indicators, as well as with the dependent variables, the signal of regional differences is captured. The East area (zone Rif) is positively correlated with ‘risk sessions’, ‘environmental identity’, ‘protect future’ and ‘invest money’, unlike the central area (zone Mediterranean Martil), which is negatively correlated with ‘environmental identity’ and ‘protect future’. The West area (zone Atlantic) does not show correlation with any of the proposed indicators (Table 4). This variability within the region confirms a higher risk awareness of the East zone, which has a stronger risk memory than the central or, more particularly, the West zone.

Table 4: *Correlations between the constructed indicators, dependent variables and three different zones of the study*

	Risk Informed	*Risk Sessions*	*Place Attachment*	*Trust Science*	*Trust State*	*Environmental Identity*	*Precautions*	*Protect Future*	*Invest Money*
Zone Rif	.074	.177**	.040	-.043	.049	.171**	.070	.217**	.100*
Zone Med Martil	-.015	-.099	-.050	.084	-.092	-.193**	.012	-.148**	-.089
Zone Atlantic	-.068	-.085	.015	-.053	.056	.037	-.096	-.071	-.007

** with significance < .01 * with significance < .05

3.3. Explaining actual readiness to protect based on past and present risk awareness

Risk awareness was tested against the above presented demographic variables and constructed indicators, with a dependent variable ‘precautions’. The regression analysis contained three blocks of variables: the first block was for demographic variables of gender, age, zone and education; the second block was for the assessed risk awareness (variables ‘risk informed’ and ‘risk sessions’), personal experience with the risk and general feeling about the level of knowledge about the risk; and the last block included variables related to trust in science and state, environmental identity, place attachment and willingness to move out. Results are presented in Table 5a.

The first model (binary logistic, ‘Precautions’) shows significance of three variables: ‘personal experience’ (*.904*, $p < .05$), ‘environmental identity’ (*.349*, $p < .05$) and ‘moving out’ of the zone (*.278*, $p < .01$), with Nagelkerke $R^2 = .129$. It is observed that demographic variables do not significantly predict if the respondents take precautions to protect themselves from the potential natural risk.

The second block of variables - where demographic variables are controlled – shows that personal experience positively influences precaution taking. This result confirms the importance of previous experience in taking measures to protect. People living in the Rif zone also take more precautions than people in other areas (marginal significance $p < .1$). The local territorial variations within the region are confirmed by this result, where the Rif region has a fresher memory of previous disastrous events.

Furthermore, among the additional variables introduced in the third block, the variables of environmental identity and of moving out of one's municipality are significant and contribute to improving the model. This confirms the importance of recognizing environment as an important part of one's personality, as well as the readiness to move out and to change municipality for some other. Finally, both place attachment and trust indicators did not contribute to explaining precaution-taking.

Table 5a: *Binary Logistic model of precautionary behaviour ('Precautions', N=307)*

Block	*Predictor*	*-2 Log-likelihood*	*Nage-lkerke R²*	*χ²*	*df*	*Sig*	*B*	*SE*	*Exp(B)*	***95% C.I. for Exp(B)*** *Lower*	*Upper*
1		286.003	.030	5.665	5	.340					
	Age						.002	.306	1.002	.550	1.826
	Gender						.153	.309	1.165	.635	2.136
	Education						-.012	.320	.988	.528	1.850
	Zone Rif						1.086*	.531	2.963	1.047	8.386
	Zone Med Martil						1.012*	.514	2.752	1.004	7.543
2		278.149	.070	13.518	9	.141					
	Age						.029	.315	1.030	.556	1.909
	Gender						.242	.317	1.274	.685	2.370
	Education						-.140	.343	.870	.444	1.704
	Zone Rif						.940	.548	2.560	.874	7.496
	Zone Med Martil						.752	.530	2.121	.751	5.990
	Personal Experience						.906*	.378	2.474	1.178	5.194
	Feeling How						-.097	.151	.907	.675	1.219
	Risk Informed						.230	.345	1.258	.639	2.475
	Risk Sessions						.296	.332	1.345	.702	2.576
3		266.436	.129	25.232	14	.032					
	Age						.147	.336	1.158	.599	2.239
	Gender						.258	.328	1.294	.680	2.463
	Education						-.123	.362	.884	.435	1.797
	Zone Rif						1.032	.561	2.806	.934	8.426
	Zone Med Martil						.801	.544	2.227	.767	6.464
	Personal Experience						.904*	.396	2.468	1.136	5.361
	Feeling How						-.199	.165	.820	.594	1.132
	Risk Informed						.144	.358	1.154	.572	2.331
	Risk Sessions						.165	.344	1.180	.602	2.314
	Trust Science						-.077	.157	.926	.680	1.261
	Trust State						-.060	.182	.942	.659	1.345
	Environmental Identity						.349*	.151	1.418	1.055	1.905
	Place Attachment						.007	.149	1.007	.751	1.349
	Moving Out						.278**	.098	1.320	1.090	1.599

** with significance < .01 * with significance < .05

3.4. Explaining future willingness to protect and to invest based on actual risk awareness

The second model proposes the same variables to explain the willingness to protect from future risks (Table 5b, 'Protect Future'), also through a logistic binary regression. Moreover, the third model tested is developed in order to describe precisely the readiness to protect from future risks by investing money (Table 5c, 'Invest Money', in Appendix). The type of model is the same, but instead of the variable of precaution-taking or protecting from future risks, the used variable is the readiness of the respondents to directly invest money in order to protect their lives and belongings in the future.

The second model (explaining the future protection) shows a significant association with origin from the Rif zone (*.828*, $p < .05$) and attending risk sessions (*.864*, $p < .01$), with

Nagelkerke R^2 = .186. The variable ‘risk sessions’ is positively and significantly associated. This suggests that people who attended risk awareness sessions rather consider protecting themselves in the future than those who did not take part in this type of risk awareness sessions.

The third binary logistic model (Table 5c, Appendix) is aimed at analysing the predictors of the respondents’ readiness to invest money in order to protect themselves in the future. Among the variables that positively predict readiness to invest money are ‘gender’ (*.618*, $p < .05$), ‘education’ (*.621*, $p < .05$), and ‘environmental identity’ (*.373*, $p < .01$), with Nagelkerke R^2 = .176. According to this, those respondents that are female, more educated and that are found to have an environmental identity declare to be more willing to invest money to protect in the future.

Table 5b: *Binary Logistic model of future precautionary behaviour ('Protect Future', N=312)*

Block	*Predictor*	*-2 Log-likelihood*	*Nage-lkerke R^2*	*χ^2*	*df*	*Sig*	*B*	*SE*	*Exp(B)*	***95% C.I. for Exp(B)*** *Lower*	*Upper*
1		409.940	.092	22.263	5	.000					
	Age						-.469*	.240	.626	.391	1.001
	Gender						-.092	.243	.912	.567	1.467
	Education						.445	.249	1.560	.957	2.544
	Zone Rif						.901**	.340	2.462	1.263	4.798
	Zone Med Martil						.198	.320	1.219	.651	2.283
2		393.712	.155	38.492	9	.000					
	Age						-.378	.247	.685	.422	1.113
	Gender						-.047	.252	.954	.582	1.564
	Education						.153	.270	1.165	.686	1.978
	Zone Rif						.784*	.357	2.191	1.088	4.413
	Zone Med Martil						.101	.339	1.106	.569	2.150
	Personal Experience						.216	.266	1.241	.737	2.091
	Feeling How						.041	.114	1.041	.834	1.301
	Risk Informed						.402	.274	1.495	.873	2.560
	Risk Sessions						.848**	.254	2.334	1.419	3.841
3		385.429	.186	46.774	14	.000					
	Age						-.424	.260	.654	.393	1.090
	Gender						-.001	.262	.999	.598	1.668
	Education						.284	.288	1.328	.756	2.335
	Zone Rif						.828*	.363	2.289	1.124	4.665
	Zone Med Martil						.155	.347	1.167	.591	2.304
	Personal Experience						.129	.276	1.138	.662	1.954
	Feeling How						.020	.124	1.021	.800	1.301
	Risk Informed						.373	.281	1.452	.838	2.516
	Risk Sessions						.864**	.264	2.372	1.414	3.980
	Trust Science						.004	.128	1.004	.780	1.291
	Trust State						-.085	.144	.918	.693	1.217
	Environmental Identity						.132	.112	1.141	.915	1.422
	Place Attachment						.218	.125	1.243	.973	1.589
	Moving Out						.161	.083	1.175	.999	1.381

** with significance < .01 * with significance < .05

3.5. Three social profiles among the population of North Morocco are detected.

A tool used to visually summarize data about the survey's respondents was a Multiple Correspondence Analysis, where the above-mentioned variables were integrated, in order to compose social profiles among the investigated population. All variables included in the analysis were numeric and nominal. Two dimensions obtained represent categories with the highest contribution to the total variance in the data. Dimension 1 (α = .582) accounts for 21.01 % of variance, and dimension 2 (α = .383) accounts for 15.27 % of variance, resulting therefore in 36.28 % of the total variance in the data displayed by the plot (Figure 4).

The variables that contribute to dimension 1 are the education level, notably holding a university degree, environmental identity, and the feeling of knowledge one has on hazards.

On the other hand, opposed variables related to dimension 2 are age, notably an age of over 60 years, place attachment, and trust in science and state. Only those variables are active, but are plotted along with the variables that have a marginal contribution ('protect future', 'invest money') and with the supplementary variables of zones of study.

Three groups of variables emerge. The first group, with a positive contribution of the first dimension, is composed of those respondents that hold a university degree, that consider themselves well-informed and have a strong environmental identity. Members of this group are marginally ready to protect themselves in the future and they are named 'aware' in the figure.

The second group, contrary to the first, with a negative contribution to the first dimension, consists of respondents without university degree that have a low environmental identity and are not considering future protection. They are named 'sceptical'.

The final group, the positive contribution of the second dimension, comprises those respondents who are over 60 years old, who display a high place attachment and high trust in state and institutions. They are described as 'indifferent' on the figure.

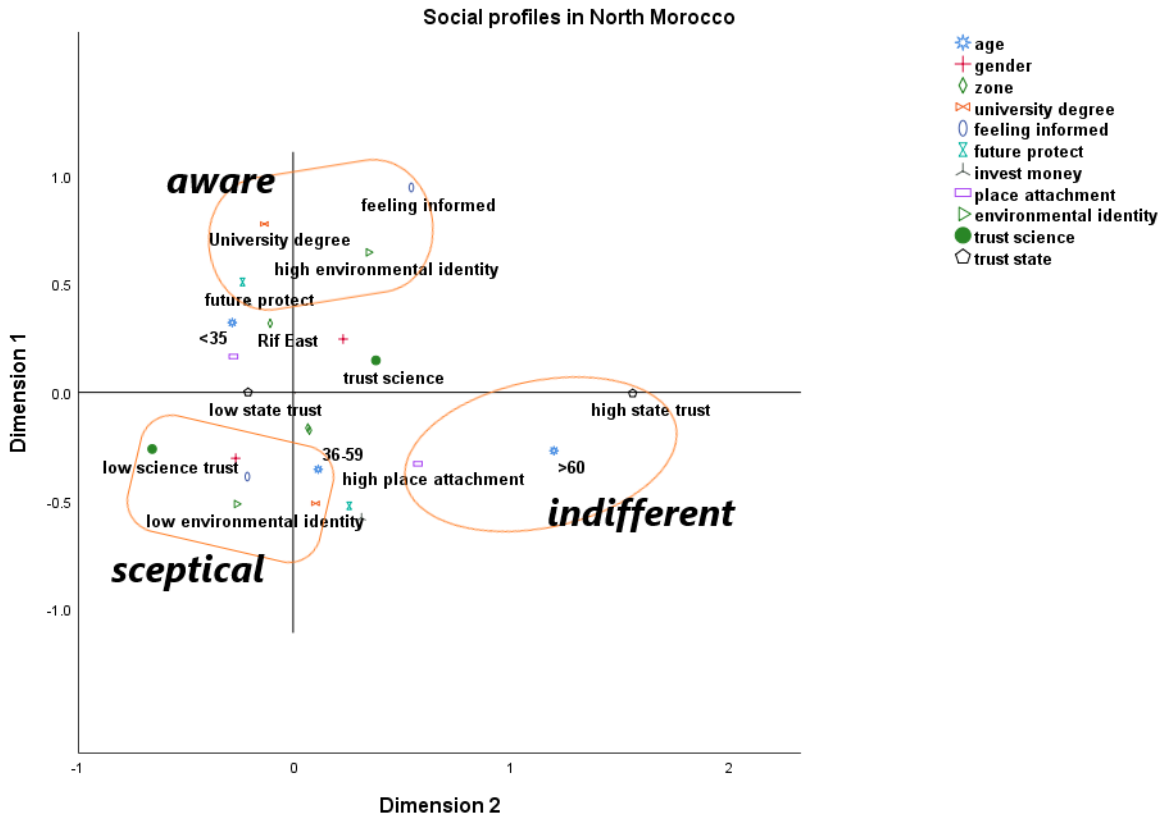

Figure 4: Detected social profiles in the region of North Morocco

4. *Discussion*

People living in hazard-prone areas have personal experience and knowledge of risks. How can this knowledge be matched with modern scientific information on risk management? This

study was focused on the determination of variables that contribute to risk awareness, which stems from risk sessions. The significance of variables used to explain the present and future precautionary behaviour was tested. Finally, the local distribution of risk awareness within the region of North Morocco was revealed, indicating the importance of geographical, historical and social background of the area.

4.1. Correlations

Precautions taken are positively correlated with 'risk sessions' (*.227, p < .01*), and with 'environmental identity' (*.111, p < .05*). Firstly, this indicates that the population of North Morocco seems to be learning and accepting the information communicated during risk sessions to boost its risk awareness and finally taking the precautions needed, and secondly, that people take more precautions to protect if they identify themselves as having a higher environmental identity.

In addition, the positive correlation between 'environmental identity' and 'place attachment' (*.143, p < .01*) can be interpreted as an increased sense of place, which gives perspective to understand the place of environmental identity in the construction of the relationship to the territory [32]. However, contrary to the positive correlation between 'environmental identity' and 'risk sessions' (*.335, p < .01*), the correlation between 'place attachment' and 'risk sessions' is negative (-*.103, p < .01*). This could possibly suggest that people are more attached to their territory if they are not aware of all the dangers that could be encountered there [40], confirming that those respondents strongly attached to their municipality perceive natural hazards, but underestimate or deny their potential effects. These results could mean that strong place attachment is the cause for believing that the place is safe and that there is no need to feel at risk; contrary to environmental identity, which is higher as respondents are more aware of risks. That could possibly mean that environmental identity enables resilience, but place attachment prevents resilience through a denial effect.

An interesting signal of the local differences within the region is shown if we consider the correlations between three zones of study and the constructed indicators and dependent variables (Table 4). The East part of the region (Rif) seems to be the most risk aware, with the positive correlations with 'risk sessions' (*.177, p < .01*), 'environmental identity' (*.171, p < .01*), 'protect future' (*.217, p < .01*) and 'invest money' (*.100, p < .05*). The central part (Mediterranean Martil) is negatively correlated with 'protect future' (-*.148, p < .01*) and with 'environmental identity' (-*.193, p < .01*). The different tendency could be explained by the different history of natural hazards that these two zones have in common. The Rif zone was hit by a series of earthquakes in recent history. The most devastating among them occurred in 2004, revealing the state's failure to manage the disaster after the event. Indeed, the population seems to have learnt from this event to take some future protective measures. Also, the Rif Mountain zone was rather ignored in the Moroccan society during the 20th century, particularly after the Rif rebellion in 1958, due to ethnic tensions between Arabs and Amazighs (Berbers) [42]. The zone Atlantic does not show any correlation, possibly due to the lack of some big natural disaster that would remain fresh in the population's memory.

4.2. Variables explaining present and future readiness to protect differ from one model to the other

From the above presented models some conclusions can be drawn about the Moroccan society's relation with multi-risks in the region. All models use the same independent variables and they differ by the dependent variable tested. All models are improved with more blocks of variables included and, therefore, the variability of human risk awareness is better described.

The significance of the variable 'personal experience' from the first model 'precautions', together with the 'zone Rif', 'moving out' and 'environmental identity', shows the impact on inhabitants when it comes to taking precautions or not (in line with [41]). All four variables positively predict precaution taking. Firstly, those participants that had 'personal experience' of natural hazards present a significantly higher probability of taking precautions ($.904$, $p < .05$), which confirms a traditional relationship [40, 51]. However, it should be underlined that less than 17% of the respondents did take measures to protect. The significance of the variable 'moving out' in this model ($.278$, $p < .01$) could be explained by the strong belief that precautions should be taken when facing high risks, even if that would mean to move out and leave the territory. Moreover, the models confirm the local variations within the region, as shown previously by correlations. Dwelling in the Rif zone has a marginally significant impact on risk awareness and protecting (1.032, $p < .1$), which differs from other zones, due to recent seismic history, and due to the cultural and historical differences of this zone based on the interior distrust between the Rif zone and the central government [42]. Finally, 'environmental identity' shows that the relationship with the nature seems to have an impact on risk awareness and taking precautions ($.349$, $p < .05$). This information could be useful for policy makers, where they should promote ecological concerns and encourage local action to resolve environmental issues, while promoting risk mitigation measures.

According to the result from the second model on future protection, those respondents that are from the Rif region and that have participated in risk awareness sessions do plan to protect themselves in the future. Contrary to the first model, here the variable 'risk sessions' is significant and with a positive signal ($.864$, $p < .01$). This could be considered as a confirmation that residents learn and are willing to improve their behaviour in the future. As already discussed, the significance of the Rif municipalities of Al Hoceima, Chefchauen and Oued Laou ($.828$, $p < .05$) could be explained by the more severe consequences that this part of the region experienced, notably by Al Hoceima's earthquakes. In addition, only slight change from future protection to investing money results in different significant variables. In the third model, the significant demographic variables are 'gender' and 'education' and a constructed variable 'environmental identity' ($.373$, $p < .01$).

It is, therefore, worth noting that the predictors of future protection intention differ from the variables of future investment intention ('protect future' > 'invest money'). The latter model has different significant variables that cause the model's outcome. Further research on different types of respondents' protections is needed, since not all measures are financially

valued. It would be motivating to see if the non-financial measure of protection is seen more as a personal measure (e.g., improving the construction of the house on one's own without spending money) or as an ethical or divine compensation for good life (e.g., praying and being a better person). This is why a future study should include the 'divine' component as a risk management tool. That study should rather be conducted by using interviews in order to understand the subtle and complex relationship that religion can maintain with natural risks and the protective behavior of the population, as suggested in [24].

4.3. The regional variability emerges from the social profiles.

Although it could arguably be expected to see the distribution of social profiles (Figure 4), that the younger, educated and those with high environmental identity are aware of risks; that the less educated with low environmental identity are sceptical, and that the eldest with high trust in state and institutions are indifferent, it is the regional variability that is the added value of this analysis. The Rif zone of the region could be described as aware (or just preoccupied), and the Mediterranean and the Atlantic zones almost coincide and could be seen as sceptical. This could be due to both historical and cultural differences between those two zones, which were merged into the same region just recently, after the territorial reform of 2015 [35]. The Rif zone is not only as of recently part of the same region as Tangier and Tetouan, they share different cultural and historical background, as well. Rif is a zone of ethnic group and language Amazigh, that was rather neglected in the time period between 1958, when the Rif rebellion occurred and 1999, when king Muhammad VI was inaugurated [42]. The process of new 'unification' started with the creation of a Royal Institute of Amazigh Culture and went on until 2011, when the standardized Tamazight was recognised as a co-official language. [43, 44]. Finally, this zone was hit by a series of earthquakes, among them the most devastating one from 2004, when the state failed in managing the crisis provoked by the earthquake. Bearing in mind that earthquakes have a special meaning for Muslims among all natural disasters [27, 28], all the aforementioned reasons could explain why the population from the Rif zone is identified as aware among the region's social profiles, contrary to the two other zones.

4.4. Limits of this study

There are few caveats to our study that need to be mentioned. Although we gave our best to make the sampling most random, the study was done without the assistance of a specialized recruitment enterprise, and the participants of this study were not sampled by standards of a professional recruitment procedure, which would pay attention to an even distribution of age, gender and socioeconomic status, as was the case in ex. [24], partly due to the social specifics of our case study, and partly due to the available resources. Furthermore, the questionnaire was long and the participants were not compensated for their time with any voucher or gift, like in ex. [41], and therefore there was some withdrawal.

Moreover, the rate of urban population in Morocco is around 62%[10] and our study was almost exclusively based in urban centres, with only one rural municipality (Oued Laou). The enlargement of the sample to rural population would contribute to better addressing the differences within the region. Finally, we acknowledge that by using the quantitative method of questionnaires, the respondents have very limited response options, and the information grasped is reduced to a position on a 1-5 Likert scale. Here we were only interested in declared behavioural intention, not in actual behaviour, and there is always a significant gap between behavioural intention and effective behaviour. Nevertheless, the study still informs about a state of mind, a perceived judgment of the question and a willingness to consider action or not. As such, the study should be taken into account for further policy developing process.

4.5. Future perspectives

North Morocco is a migration hub, with internal migrations from other Moroccan regions, with tourist influx, and with other temporary migrants that gather in the region, trying to cross the sea and reach Europe, following every accessible route. Only in 2019, slightly more than 26,000 people reached Spain by sea, mainly from Morocco [3]. With all these types of migration, people with different historical, cultural and social background arrive. Without risk memory and local risk culture, these people might be more vulnerable due to their lack of local social support. There is hence a growing need to address local awareness particularities of this region, along with immigrants' perception of local risks, as it has been done recently for Chile [56] or Austria [63], in order to find variables permitting to enhance the inhabitants' perception of risk, as well as their protection behaviours.

Furthermore, earthquakes have a specific connotation in the Muslim culture and they have already been elaborated in the academic literature [23, 27], with an additional work that brings together risk communication and historical traditions, local knowledge and Muslim beliefs [28]. Still, this religious resistance regarding earthquake risk management was seen to be significantly more common among the less educated populations, who were "more likely to reject the significance of scientific assessment adding that 'Allah knows all' and that a belief in divine protection was more important and effective" [23](p. 228). Although not directly asked, this reference on God's will was informally introduced by the respondents many times during the interview. Moreover, during a field work in the region, the same aspect was highlighted in an interview with M. Chentouf, a theologist, imam and vice-dean of the Faculty Oussoul Eddine from Tetouan. During further meetings with town officials the importance of religion in risk management was endorsed, as well. A future study should include the divine component as a risk management tool, not only dealing with seismic hazard, but in relation to all the other hazards encountered in the region. This could be particularly effective in rural communities where the mosque is sometimes the only

[10] http://uis.unesco.org/country/MA (online access 6 January 2020)

institution of reference for the locals. That study should collect data through interviews, rather than questionnaires, in order to understand the subtle and complex relationship that religion can maintain with natural hazards and the protective behavior of the population.

4.6. Conclusions

With this paper we aim at explaining risk awareness related to natural hazards and the measures taken or intended to be taken to protect people in a particular region understudied on this topic. Given the uncertain nature of risks, their characterization by individuals and groups, more studies on local risk awareness and precautionary behaviour are needed. Our case study is particular because it was held in a developing country, where the understanding of risk is complex due to traditional culture and social heterogeneity, and within a region where natural multi-hazards can be encountered at a limited spatial scale. A previous lack of research in this territory (which is due to difficulties for its realization: access to population, cultural differences, level of education, economic cost of the study, administrative and diplomatic questions), and the natural and social complexity of the topic contribute to a high necessity for undertaking the study.

In North Morocco, the local population is a heterogeneous group and the differences within the region do emerge. It shows that sharing a common, homogenous territory depends on deeper bounds than those created by a pure administrative decision. The different historical and cultural background of the East part of the region, with the fresh memory of one big recent disaster, contributes to differences in risk awareness among them and the rest. During that sad event of 2004, the state did not succeed in effectively managing the crisis. In order to avoid future disasters, there is a dire need of bridging between different social structures of the region.

Additionally, more follow-up on the indicators of risk awareness sessions should be established, so as to trace the success rate of the resilience of the Moroccan society, which is facing multi-risks. ‘Risk sessions’ seems to be a significant variable in the model related to future protection measures, where further research is needed in order to either confirm the effectiveness of the model or to prove that it suffers from a self-selection bias. ‘Risk sessions’ have an impact on local people deciding whether they will protect themselves and their belongings in the future and due to these positive links they should be supported by the local and national government. The same goes for ‘environmental identity’ that has to be promoted, too. By endorsing ecological concerns and taking local action to resolve the actual environmental questions, North Morocco could profit from the positive effects on the general awareness of risks. Environmental identity could be promoted through campaigns and be based on agricultural roots of the local people, which could make it close and comprehensible to the population.

Appendix

Table 5c: *Binary Logistic model of future financial precautionary behaviour ('Invest Money', N=309)*

Block	*Predictor*	*-2 Log-likelihood*	*Nagelkerke R²*	*χ²*	*df*	*Sig*	*B*	*SE*	*Exp(B)*	***95% C.I. for Exp(B)*** *Lower*	*Upper*
1		400.380	.080	18.849	5	.002					
	Age						-.255	.244	.775	.480	1.249
	Gender						.470	.250	1.600	.981	2.610
	Education						.914**	.260	2.494	1.498	4.151
	Zone Rif						.417	.341	1.518	.778	2.959
	Zone Med Martil						.278	.323	1.320	.700	2.488
2		388.908	.126	30.321	9	.000					
	Age						-.162	.251	.851	.520	1.393
	Gender						.559*	.259	1.749	1.053	2.905
	Education						.638*	.275	1.892	1.103	3.245
	Zone Rif						.295	.355	1.344	.670	2.693
	Zone Med Martil						.218	.340	1.244	.639	2.422
	Personal Experience						.158	.267	1.171	.695	1.975
	Feeling How						.201	.116	1.223	.975	1.533
	Risk Informed						.246	.278	1.279	.742	2.203
	Risk Sessions						.459	.259	1.582	.953	2.626
3		375.943	.176	43.286	14	.000					
	Age						-.116	.266	.891	.529	1.501
	Gender						.618*	.271	1.855	1.091	3.155
	Education						.621*	.294	1.860	1.045	3.313
	Zone Rif						.331	.361	1.393	.687	2.826
	Zone Med Martil						.316	.349	1.372	.693	2.716
	Personal Experience						.116	.278	1.123	.651	1.935
	Feeling How						.094	.126	1.099	.858	1.407
	Risk Informed						.155	.284	1.168	.669	2.037
	Risk Sessions						.329	.269	1.390	.820	2.354
	Trust Science						-.038	.131	.963	.745	1.243
	Trust State						-.114	.144	.893	.673	1.184
	Environmental Identity						.373**	.114	1.452	1.160	1.816
	Place Attachment						.010	.125	1.010	.791	1.290
	Moving Out						.117	.084	1.124	.954	1.325

** with significance < .01 * with significance < .05

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