The neglected country(side): earthquake risk perceptions and disaster risk reduction in post-Soviet rural Kazakhstan

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Introduction

Most of the world's population now live in urban areas. Approximately 90% of this growth occurs in low- and middle-income countries (LMICs) whose urban areas are currently expanding at a rate of a 1.3 million people each week (UN DESA 2015). The sheer concentration of lives and assets in these urban areas exposes more people more often to more risk and, as a consequence, raises the hazard profile of cities as compared to rural areas (Bilham 2009). Over the last decade, therefore, the focus has largely been on saving lives and protecting infrastructure in urban areas (e.g. the UNISDR's "Making Cities Resilient" campaign or the UN-Habitat World Urban campaign). Yet these statistics can be misleading. Indeed, according to the World Bank (2018), 68 % of people in low-income countries and 60 % in lower middle-income countries still live in rural areas. As pointed out by Tania Li, "although UN agencies announced in 2008, half of the world's population was living in cities, more than half of the population of Africa and Asia continued to live and work in rural areas, and gained their livelihoods mainly from agriculture" (Li 2014:3). This important fact is often overlooked.

The focus on the urban has, we argue, resulted in a neglect of the countryside which has serious consequences. The vulnerability of rural populations is usually underestimated or overlooked despite such areas often being as adversely affected as urban ones even if the devastation is over a much more widespread geographical area. Indeed, as Wyss (2018) has demonstrated, "most large to great earthquakes are rural, with typically more than 85 % of fatalities being rural people". The large numbers of small settlements near active faults, and the structural weakness of rural dwellings which are commonly less resistant to shaking than urban dwellings, account for much of the vulnerability of the rural population (Wyss 2018; see also Robinson et al. 2018). The 2015 Gorkha earthquake in Nepal is a case in point, with 92 % of fatalities classified as rural (Wyss 2018). More structural damage was done to buildings in the central and western regions of the country than in the capital Kathmandu[1], and the death toll was only minimised by the fact that most rural people were working outside at the time the main tremor struck (Petal et al. 2017).

What people think about earthquake risk is not only important at the national level, influencing decision-makers on matters of risk management and building code implementation, but is also a crucial element in determining individual behaviour at the household and community level. Not only have most existing studies of risk perception traditionally examined the attitudes of people living in urban centres but these studies are overwhelmingly of cities in high-income countries (HICs) in North America, Western Europe, Australasia and Japan (Slovic 1987; Hinman et al. 1993; Karpowicz-Lazerg and Mullet 1993; Rohrmann 1994). Only more recently has research begun to explore popular attitudes in some LMICs and upper middle-income countries (UMICs), especially those countries that have experienced higher degrees of economic development in recent decades. As Bronfman and Cifuentes comment in their study of risk perceptions in Chile: "The more a country develops, the

[1]

greater becomes its population's concern about hazards and the greater the demand for their control and regulation" (2003:1271). Other studies, however, are not so sanguine. Cities are the principal hubs of economic development where industry, infrastructure and population are disproportionately concentrated. Istanbul, for example, houses approximately one-eighth of the total population of Turkey and accounts for one-half of its entire industrial potential (Erdik and Durukal 2007:181). Many of these cities are also located on major active seismic faults that make a major earthquake not only a human tragedy but also a national economic disaster (Bilham 2009; England and Jackson 2011). Much of their populations, too, live in buildings that are non-compliant with existing or inadequate building codes, where recent studies show just the opposite, that public awareness of earthquake risk is very low (Paul and Bhuiyan 2010; Ainuddin, Routray and Ainuddin 2014).

This bias towards HICs and preoccupation with the urban environment is even more pronounced when it comes to a consideration of risk perceptions in the post-Socialist countries that emerged following the collapse of the USSR in 1991. Soviet attitudes were scornful of village life, mainly depicting it as a residual form of socio-economic organisation doomed to disappear in the course of the Marxist five-stage schema of social development towards socialism and communism (Gellner et al. 1975). Rural studies were therefore largely neglected or confined to uncovering the ethnogenesis of peoples (*narody*) and establishing their rights to autochthony (Abashin 2014). These prejudices were also strongly evident in the USSR's management of earthquakes and their aftermaths that were focused primarily on urban centres (Raab 2017:13). Rural areas were neglected in both the Ashgabat earthquake in Turkmenistan (1948) and the Spitak earthquake in Armenian (1988) despite the thousands of casualties outside of the cities. In the case of Armenia, 40 % of the national territory was affected (Doose 2017: 269). Raab observes how earthquakes were perceived as largely a phenomenon of the periphery, i.e., Central Asia and the Caucasus, rather than one at its centre, the urban Slavonic heartlands, and, in the process, imposed a form of Marxist developmental typology on nature itself (Raab 2017: 209). As a consequence, earthquakes received little serious consideration or publicity before the Tashkent earthquake of 1966 in Uzbekistan that was used by Soviet leaders Brezhnev and Kosygin to showcase the friendship among peoples of the USSR and the Soviet state's ability to rebuild a model city from the ashes (Raab 2014).

This bias continues in post-Soviet societies today. While there is some interest in the urban environments of the former Socialist countries of Eastern Europe (Armaș 2006), research into risk perceptions in the Caucasian and Central Asian republics of the Soviet Union is limited. During the Cold War, this geographical space was conceptually denominated as the Second World and was generally assumed to have disappeared in 1991. Elsewhere we argue that just because something no longer exists on a map does not mean it ceases to exist in the minds of the people who lived within its borders, shaping not only the way people thought and behaved in the past but continuing to influence the way they think and act in the present. When it comes to a consideration of disaster risk management, the former Soviet Union and its satellite states have been simply absorbed into the category of LMICs without any consideration of their recent socio-economic and political legacy (Bankoff and Oven 2020). Yet, as Caroline Humphrey points out, the Soviet mentality was a deeply pervasive phenomenon that permeated all facets of society and daily life (Hann et al. 2002:12). This Soviet legacy is still an important consideration when it comes to understanding earthquake risk perception and how risk is managed in these countries today, shaping the epistemological framework with which people think about nature and their technocratic attitudes towards

earthquakes, and pervading the organisation and practice of emergency response at all levels of operation (Bankoff and Oven 2020).

Kazakhstan is viewed as one of the "successful" successor states of the former Soviet Union, able to steer a path through the severe economic disruption, fiscal uncertainty and social dislocation that marked the breakup of the USSR partly due to its immense reserves of oil and gas, and partly as a result of the authoritarian leadership of President Nursultan Nazarbayev. In 2015, its per capita GDP was approximately the same as that of Russia (Bershidsky 2015), with Kazakhstan aiming to become one of the top 30 global economies by 2050 (OECD no date). Kazakhstan was a predominantly rural society until 1970, reflecting the country's nomadic past, and that balance has only marginally changed in favour of the urban population in recent decades (World Bank data[2]).

Substantial parts of Kazakhstan, in the south and southeast of the country in the foothills of the Dzhungaria and Tien Shan Mountains, are highly vulnerable to earthquakes and lie along the Alpine Himalayan seismic belt. This is also the part of the country where two of the three largest cities are located, Almaty and Shymkent, and where the population is highest. Events in the recent past, including the 1887 Vernyi (now Almaty, the former capital city) earthquake (Ms 7.3±0.5)[3], the 1889 Chilik earthquake with its epicentre around 120 km east of Vernyi (Ms 8.3±0.5), and the 1911 Chon-Kemin earthquake in the mountains south of Vernyi bordering Kyrgyzstan (Ms 8.02±0.3) (Bogdanovich et al. 1914, Molnar and Ghose 2000, Kulikova and Krüger 2015). This latter earthquake destroyed more than 770 brick buildings in Vernyi and was felt over an area of four million km^2 (Kondorskaya and Shebalin 1982; Havenith and Bourdieu 2010:141; and Kulikova and Krüger 2015). Despite the long period of relative seismic inactivity since 1911, with only two earthquakes that have struck population centres of any size, at Zaysan in 1990 (Ms 6.9) and Lugovskoy in 2003 (Ms 5.4), earthquake risk in the region remains high (Ball et al. 2016). Indeed, the decision to move the country's capital from Almaty to Astana (now Nur-Sultan) in 1997, was publicly attributed to the earthquake risk in the South of the country.

Notwithstanding the risk posed, however, little is known about individual and household understandings of earthquake risk or the levels of preparedness at the household and community level in this post-Soviet state. This perhaps reflects a wider paucity of social science research on Central Asia dating back to the Soviet period. As noted by Kandiyoti: "The relatively modest compendium of ethnographic and sociological research produced during the Soviet period is not only outdated but the drying-up of research funds since the break-up of the Union has meant that social science research - which was relatively weak in the Central Asian region in the first place - has come to a standstill" (1999:500). Further, Werner, in her report to the National Council for Eurasian and East European Research, highlights that most studies on post-Soviet Central Asia focus on macro-level processes and/or urban populations, with few accounts of micro-level conditions (2000:iii).

[2] In 1970, 50 % of Kazakhstan's population was urban; by 2019, this figure had increased to 57 %. See: https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?end=2019&locations=KZ&start=1960

[3] Ms refers to the surface wave magnitude and was commonly used before 1979 when Mw was introduced as a measure of earthquake energy release.

Perhaps unsurprisingly, then, the earthquake perception studies that are available are confined to the urban environment. A recent study of risk perceptions among the residents of Almaty found little evidence of increasing levels of risk awareness or preparedness despite rising living standards; only 33 % of respondents indicated that they felt well-informed about local hazards, and a massive 93 % took no steps to prepare themselves for their eventuality (Mussakulova 2017:224-225). While we are not aware of any pre-1991 comparisons, the data suggests a low level of risk awareness and disaster preparedness, at least amongst the urban population of Kazakhstan. Douglas argues that social groups hold a consistent form of explaining misfortune (Douglas 1966). What any society deems an acceptable level of risk is determined collectively by its members who decide which risks to prioritise over others according to the prevalent principles of that particular form of social organisation (Douglas and Wildavsky 1983). Prior to 1991, those principles were heavily influenced by Kazakhstan's incorporation within the Soviet Union and the legacy of those decades remains strong. Despite the rapid socio-economic changes since independence, people are highly likely to start with the risk perception associated with the cultural values that they have assimilated through childhood and education (Kahan et al 2011:168).

However, perceptions of risk are particularly difficult to gauge when it comes to hazards like earthquakes that are low-frequency but high-magnitude. Slovic shows that people tend to dismiss risks that are perceived as being uncontrollable, have catastrophic potential or result in fatal consequences and that they "refuse to worry about losses whose probability is below some threshold" and "to ignore rare threats" (Slovic 1987; Slovic et al. 2000: 69-70). The diffuse network of largely unknown faults within the continental interior of Asia slip at a rate of a few tenths to a few millimetres per year and require hundreds or even thousands of years to accumulate sufficient strain. However, they result in a disproportionate number of devastating earthquakes with magnitudes >7 M_w and death tolls in the tens of thousands (England and Jackson 2011). The flat steppe of Kazakhstan only acts to amplify ground shaking during such events as its thick lithosphere facilitates the transmission of vibrations (Ball et al. 2016:9). Not only urban centres but rural villages are highly vulnerable under these conditions.

A better understanding of seismic risk perception is, we argue, essential to developing appropriate seismic risk communication plans and adopting proactive measures for risk reduction (Vicente 2014:274). As Covello (2010) shows, there are many risks that worry and upset people but cause little harm and there are also many risks that kill or maim many people but do not unduly worry or upset them. In this sense, the seismic profile of Kazakhstan resembles that of Portugal where there are many minor earthquakes below Ms 5 but no major one since the Lisbon Earthquake of 1755 that devastated the country's capital. Despite the fact that most people have experienced tremors, for Vincente, the Portuguese "do not have a correct perception of seismic vulnerability, hazard and risk" (Vicente 2014:274). Our aim in this study, therefore, is to better understand the level of earthquake awareness among the rural population of the most populous and one of the most seismically active regions in the country, Turkistan (formerly South Kazakhstan) oblast. In this paper we draw on the findings from a questionnaire survey and focus group discussions of 302 residents administered across six rural communities located across three different rayons or districts in the oblast to (1) assess what hazards preoccupy rural people, (2) explore attitudes towards earthquakes, and (3) determine the level of preparedness of both households and the community. To balance this rather psychometric approach to risk awareness and to adopt a more cultural theory approach, we also conducted 10 focus groups discussions (FGDs) in the surveyed communities in each of the three

rayons. Our findings confirm a relatively low level of perceived threat from earthquakes and that, as a consequence, rural people did little to prepare for such an eventuality.

The role of the state in earthquake preparedness and risk reduction

Kazakhstan's susceptibility to earthquakes has long been recognised by the state. Under the Soviet Union, emphasis was placed on the preparation of seismic hazard maps and short-term prediction, an approach that continues today (Kravchuk and Mazhkenov 1997; UNDP 2004). A key figure in the Soviet earthquake prediction programme, Academician Grigoriy Gamburstev, developed a multi-disciplinary approach using geological, geophysical and seismological data to identify actual and potential earthquake zones, and, then, to calculate their expected effects. It is due to his influence that the seismic zoning maps of the Soviet Union were drawn up in 1957, 1968 and 1978. While not claiming to predict the actual timing of earthquakes, Gamburstev and his colleagues talked about a region's "seismic climate" and how its "seismic weather" varies over time (Lapwood 1970; King et al. 1999).[4] Though he died in 1955, Soviet seismologists continued the attempt to predict the place, magnitude, intensity, and timing of earthquakes, alleging some success in this respect as regards the Fergana region in 1967 (Uzbekistan), Gazli in 1976 (Uzbekistan) and Suusamyr in 1992 (Kyrgyzstan) (Lapwood 1970:214; Ulomov et al. 2002). Despite the growing popular distrust of Soviet science, especially in the wake of the Chernobyl and Spitak disasters, ERR continues to be seen as a matter for state institutions, seismologists and engineers, whereby earthquakes are predicted and the risk engineered out of the environment (Bankoff and Oven 2020)[5]. When disasters did occur during Soviet times, they were often viewed as "accidents" responded to by Civil Defence units (Gouré 1986; Vorobiev 1998). It is unsurprising therefore that a UNDP report on the Lugovskoy earthquake in Jambyl oblast in 2003 identified a population ill-informed about seismic risk, living in poor quality housing stock, with the rural poor identified as particularly vulnerable (UNDP 2004).

In recent years, the Government of Kazakhstan has committed to reducing disaster risk through adherence to the UN's Hyogo Framework for Action (HFA) and the Sendai Framework for Disaster Risk Reduction (SFDRR). According to Kazakhstan's National Progress Report on the implementation of the HFA (2011-2013) (MoES 2013), awareness raising activities had focused largely on schools. Classes were held on "natural disasters", their impacts on people and organisations, and how to secure the population living in earthquake-prone regions, including the roles and responsibilities of government agencies, civil defence and emergency services. In earthquake-prone oblasts, seismic training was reportedly carried out with the population although no specific detail was provided as to what this entailed. Indeed, according to the report, there were no public education campaigns for enhanced awareness of risk or information on DRR practices at the community level, with the public relations system on emergency situations and civil defence being described as "not effective enough, as it does not cover all interested recipients" (MoES 2013:21). Further enhancement of the educational system for DRR was therefore included in the Strategic Plan of the Ministry of Emergency Situations for 2011-2015 As regards the SFDRR and its commitment to working through

[4] See also the article attributed to G.A. Gamburtsev on the history of experimental seismology in the Soviet Union but published in 2013.

[5] Our engagement with universities in Kazakhstan as part of the NERC/ESRC-funded Earthquakes without Frontiers project suggests that the Soviet preference for the physical sciences remains unaltered, at least with respect to disaster studies (Mussakulova 2017:79-80).

civil society (a new law on civil protection was passed in 2014)[6], there is only one civil society member (unspecified) included in the national multi-sectoral platform for hazard reduction in Kazakhstan, and few NGOs working at the community level and even less are engaged in DRR (Okassov 2013:10). Despite Article 23 of the Constitution of the Republic of Kazakhstan that specifically recognises citizens' rights to form associations, the government limits this freedom through the application of the Civil Code of 1996, the fees governing the Registration of Legal Entities, and the Criminal Code of 1998 that makes all members liable for unlawful interference with the activities of state agencies (Zhovtis 1999). In December 2016, a "voluntary activities" law was adopted in Kazakhstan to provide "the expansion of the population role in activities on prevention and elimination of the aftermath of emergency situations, providing assistance to people affected by natural disasters, and other categories and groups of people who [are] in need of outside help and support" (Viktorovich 2017: 4).

Some donor funded DRR programmes have been undertaken in Kazakhstan. Examples include an American Red Cross-funded project on earthquake risk reduction in the cities of Almaty and Shymkent with the aim of increasing public awareness of earthquakes; a DIPECHO-funded project with the UNDP, the Red Crescent Society and Ministry of Emergency Situations on DRR in communities in Southeast and East Kazakhstan; a DIPECHO-funded project on strengthening the resilience of urban and rural communities in South Eastern Kazakhstan to seismic risks; and more recently, a European Commission-funded project on strengthening urban resilience in five capital cities across Central Asia, including Nur-Sultan (UNDRR 2019). However, such projects are mainly focused on the urban environment and are largely based on western ideas and models for risk reduction which are premised on the belief that people minimise risk according to behavioural norms largely drawn up by Western-trained experts (Bankoff and Oven 2020). There is no recognition of the unique set of historical factors that characterise the current societies of the former Soviet bloc. In this paper we seek to partly redress this neglect by reviewing rural householders' perceptions of, and responses to, earthquake hazard and risk and to discuss our findings in the context of Kazakhstan's Soviet past and transition to a post-Soviet future. We argue that acknowledging this past is essential to understanding local level decision-making and to informing any future DRR interventions.

Case study communities

The research was undertaken in Turkistan oblast (Figure 1) that forms part of the most seismically active southern and south-western region of the country (WHO 2012:6). The oblast is also the most densely populated region in Kazakhstan, with a population per square kilometre more than two and a half times higher than Almaty oblast, the second most densely populated region (MFA 2018).[7] It is also one of the poorest and weakest regions in terms of the Human Development Index, a composite statistic of life expectancy, education, and income per capita (Whiteshield Partners 2016). Six rural, hazard prone communities were selected in consultation with our research partners at the Red Crescent Society in Turkistan and the regional government (akimat): Atbulak and Turbat in the Kazygurt rayon; Burguluk and Tonkeris in the Tolebi rayon; and Kelte Mashat and Mashat in the

[6] The law on civil protection passed on 11 April 2014 defines emergency situations in terms of the number of deaths, people affected, and damages done. Emergencies are specified as micro, local, regional or global, according to certain criteria (Mussakulova 2017:182-183).

[7] The population density of Turkistan oblast is 23.5 people per square kilometre compared to 8.5 people per square kilometre in Almaty oblast.

Tulkibas rayon. The aim, where possible, was to capture a range of village communities in terms of their age, ethnic composition, livelihood activities, income levels, and susceptibility to earthquakes and secondary hazards such as landslides. Table 1 provides an overview of the hazard context of the six communities based upon a field survey and satellite imagery observations made by natural scientists within the research team.

[Insert Figure 1 and Table 1 here]

Methodological approach

The risk perception and response survey developed by the Earthquakes without Frontiers project team for use in different country contexts was adapted for use in Kazakhstan with our research partners at the Red Crescent Society. The survey was designed to gather baseline information about the households surveyed including information about the respondents, their livelihoods, and their perceptions of, and responses to, the risks and problems they encounter in their everyday lives. Though we were primarily interested in people's attitudes towards earthquakes and associated secondary hazards such as landslides, we were careful not to direct respondents' attention specifically to these hazards.

In preparing the survey, time was spent discussing how ideas and concepts such as hazard, risk and vulnerability translate into Russian and Kazakh languages. A detailed guidance note was subsequently prepared for the enumerators to address any potential ambiguities and to ensure questions were asked consistently to all participants. As noted by Kandiyoti, "transition economies present ... specific methodological and conceptual challenges that need to be adequately reflected in research design" (1999: 500). As a result, Kandiyoti highlights the importance of undertaking in-depth qualitative research to inform the content of quantitative surveys. An example from our own research relates to whether or not we should ask ethnic Kazakh respondents about their clan (*ru*) or horde (*zhuz*) affiliation.[8] While our Kazakh partners felt that this question was irrelevant (or even inappropriate), FGDs with community members undertaken concurrently, suggested that clan affiliation is indeed an important aspect of Kazakh culture which continues to influence rural life today (Bankoff and Oven 2019; see also the work of Schatz 2004 on modern clan politics). Clan affiliation therefore has a potentail to play in DRR including information sharing and support between clans in different oblasts, in the allocation of resources through patronage and the effective implementation/enforcement of building codes and land use plans. Once agreed, the survey was piloted in both Russian and Kazakh, and revised again based upon detailed feedback from the team of enumerators and the analysis of the findings from the pilot survey.

Approximately 50 households (302 in total) were systematically surveyed in each of the six case study communities, with the aim of minimising sampling bias. The total number of households in each community was initially determined, and the interval between households sampled

[8] As a nomadic pastoral society, identity was mainly expressed by clan affiliations that were regionally based. Organised into three tribal federations or hordes, Elder, Middle and Younger (or Great, Middle and Small), clan designation together with its loose territorial affiliation was important in governing social relations between groups and regulating nomadic land-use from at least the late sixteenth century (Collins 2006). Edwards Schatz argues that Soviet authorities failed to completely suppress clan identity which persisted in the guise of affiliation to the local kolkhoz/sovkhoz or collective farm (Schatz 2004:58-59). With few exceptions, Kazakhs are born into his or her father's patrilineage, *ru* and *zhuz*. See Werner (2000) for a more detailed discussion.

subsequently calculated (e.g. every fourth house). The survey was facilitated by members of the Red Crescent Society, an organisation familiar to, and trusted in rural communities. Enumerators were first given a training session to familiarise themselves with the aims and contents of the questionnaire and how to handle specific questions. Next permission from the relevant district government (akimat) offices and local community leaders was sought.

The surveys were carried out face-to-face in respondents' homes. Where possible the enumerators surveyed the head of the household (176 respondents), and, in their absence, a knowledgeable family member. This is reflected in the fact that more than half of the respondents were male (177 respondents), with 203 respondents aged between 35 and 64 years (Table 2). Respondents were given the option to complete the survey in either Kazakh or Russian, but respondents overwhelmingly chose to answer in Russian. This was surprising given that the Southern regions of the country are more Kazakh speaking than the predominantly Russian-speaking North and urban centres. The enumerators attributed this preference to the fact that the Russian language is better suited to discussing more "technical subjects" such as earthquakes as it has a more appropriate lexicon. We will return to this point in the discussion. It was also noted that many respondents felt comfortable using both Russian and Kazakh languages interchangeably. The survey data gathered was subsequently translated into English and entered into the statistics programme SPSS for analysis.

[Insert Table 2 here]

Surveys were followed up by focus group discussions (FGDs) to better gauge differences according to age, gender and social status. In all three districts surveyed, FGDs were held in at least one community, with separate discussions held with village elders (all male), women, and young people (under 30 of both male and female). In all 10 FGDs were held in the selected communities (Kelte Mashat, Tonkeris and Turbat) with the women's groups assisted by a female facilitator and no men present. The focus groups were mainly conducted in the Kazakh language, and in a small number of cases Uzbek. The discussions were recorded, and the digital recording transcribed and translated into English for coding and analysis.

Survey findings

Background data about the respondents is summarised in Table 2. In terms of ethnicity, the survey respondents were predominantly Kazakh (70 %), followed by Uzbek (18 %), with 12 % identifying as "other" including Russian and Chechen, or were non-respondents. This population profile mirrors the ethnic composition of the oblast as a whole where 73 % are Kazakh, 17 % are Uzbek and 11 % are classified as other (MFA 2018). Kazakh was the dominant ethnicity in five of the six case study communities, with the proportion of Kazakh respondents ranging from 56 to 100 %. In the sixth community, the dominant ethnicity was Uzbek (76 %). With the high ethnic Kazakh population, we were interested in determining whether clan affiliation was a factor in facilitating cooperation and support among villagers but only 20 Kazakh respondents were willing to declare their *zhuz*. In all 20 cases, the respondents were from the Great *zhuz* which covers territories in south and south-eastern Kazakhstan, and parts of Uzbekistan. This is consistent with information gathered from the respondents participating in FGDs who confirmed that most communities largely belonged to a single clan (Women FGD, Tonkeris 2 July 2016). The small number of respondents willing to answer this question was surprising given that clans are described as important identity markers for Kazakhs

and are reported to be particularly strong throughout the southern oblasts of Kazakhstan (see, for example, Werner's [2000] study of a Kazakh village in South Kazakhstan). Age may be one explanatory factor here, with clan affiliation being less important to the younger generation of Kazakhs, however the numbers are too small to be more definitive.

Rural livelihoods

The average size of the households sampled was 5.9 persons, with an average of 3.8 adults per household. This was notably higher than the national average of 3.4 persons per household and 4 persons per household in rural areas (Agency for Statistics 2011 cited in Shedenova and Beimisheva 2013) and may reflect the fact that households were commonly composed of at least four generations (Women FGD Kelte Mashat 17 March 2016). The residence pattern is also largely patrilocal, with married couples commonly settling in their husband's homes or communities (Women FGD, Tonkeris/Baldiberek 2 July 2016) and younger sons remaining behind in the village to look after their parents and to inherit the house (Women FGD, Kelte Mashat 17 March 2016).

The socio-economic condition of the surveyed households was generally prosperous, at least as regard essentials, with most participants regarding themselves as "comfortably off" (223 respondents). As one woman contentedly observed: "Thanks to God, this is the place where we have grown up, where we have everything – kumis (fermented mare's milk) and bread. We have horses and cows and it is very nice compared to other places" (Women FGD, Tonkeris/Baldiberek 2 July 2016). Those who regarded themselves as comfortably off varied from 67 % in Tonkeris and Baldiberek to 84 % in Mashat. A total of 59 respondents, however, regarded themselves as "not so well off" in socio-economic terms. This figure ranged from 12 % in both Mashat and Burguluk to 28 % in Turbat. Very few respondents regarded themselves as either "well-off" (4 respondents) or "needy"[9] (6 respondents), broadly mirroring the assessment of economic status undertaken by the enumerators at the end of the survey, which was based upon their own observations of household living standards and other proxy measures. Though there have been profound changes to the structures of rural society since 1991 with the disbandment of collective farms, the privatisation of landholdings, and migration to the city, especially of younger members of the community, the village still reflects a degree of social homogeneity and equality (Stawkowski 2017). However, with reports of growing inequalities as the state selectively adopts elements of a market-based economy (see, for example, Shedenova and Beimisheva 2013)[10], more variability in terms of socio-economic status might have been expected. It is also equally possible that people were reticent to self-ascribe as being among the less well-off. However, our own observations corroborate these findings with people having adequate shelter and food and even electrical appliances such as refrigerators and washing machines. Living standards were not noticeably different between Kazakh and Uzbek respondents despite the reported inequalities in education and employment for the Uzbek population, and their more limited political representation (Minority Rights Group International 2018).

[9] The word "needy" was used as it was recognised that participants were unlikely to self-define as poor.

[10] Kazakhstan is in transition from a planned to a market economy. As noted by Eicher (2004) '[t]he government and economy have experienced many radical reforms, but none completely satisfies the necessary conditions for being categorized as a market economy'. A recent Chatham House report by Bohr et al. (2019) terms Kazakhstan a semi-market economy.

Most participants owned their own house plot (297 respondents) including the house and kitchen garden (294 respondents). Those who did not own their house plot (5 respondents) either rented the land privately or built their house on government granted or community owned land. Fewer respondents owned their own farmland (199 respondents), with landownership lowest in Burguluk (32 % of the households surveyed) and highest in Mashat (100 % of households surveyed). Land holdings ranged from 0.07 ha to 145 ha across the case study communities but were generally small, with 74 % of landowners (148 respondents) owning less than 0.5 ha. Householders with larger landholdings were found in Mashat (30 ha), Tonkeris (34 ha) and Turbat (145 ha). Overall, livestock and poultry ownership, which is an important indicator of household wealth and wellbeing in rural Kazakhstan (Werner 2000), was high at 74 %, and ranged from 40 % of householders in Burguluk to 96 % of households in Tonkeris. Householders surveyed who owned livestock had an average of 11 sheep, three cattle, three horses and 11 chickens, which they reared to meet their own subsistence needs.

In addition to the domestic farm production of livestock and vegetables, most households (258 respondents) have at least one source of cash income, with little variation across the six communities. Formal employment was cited as the main source of cash income by 132 respondents (with teaching, medicine and security cited as the main professions). Owning a business was the next most frequent category, cited by 58 respondents (with examples including the production and sale of home-produced goods, mainly fermented milk products). Only 10.6 % of respondents relied upon casual labour, mainly in the construction sector. However, 31 respondents depended on pensions as their main source of income, including pensions for the disabled and veterans.

The level of education was high among villagers; most respondents were educated to secondary level or above (286 respondents), with nearly a quarter of respondents (72) holding a bachelors or masters level degree. Only one respondent reported having only basic literacy, a noticeable testament to the educational legacy of the Soviet Union. Analysing the data based on gender, we see near gender parity between men and women up to secondary school. Above this, while a higher proportion of male respondents had completed college (35 % as opposed to 19 %), a higher proportion of female respondents had completed bachelor level (23 % as opposed to 16 %) and masters level degrees (7 % as opposed to 34 %). There was no significant difference in the level of education between Kazakh and Uzbek respondents.

Table 3 summarises the main difficulties faced by householders across the six rural communities. More than 50 % of respondents stated that they did not face any difficulties, while only 10 % of respondents identified more than two difficulties faced. People's main concerns were the lack of gas in their homes. Reflecting the socio-economic dislocation experienced in rural areas after the collapse of the Soviet Union, the second most cited difficulty was the lack of jobs and employment opportunities. Many of the participants surveyed, although highly educated, were forced to undertake menial jobs, for example, cleaning in the school, or were unemployed. Problems with drinking water was a further issue identified by respondents , along with poor quality roads, roads that were difficult to access during the winter months, and in some cases no road access to key facilities including the medical centre and the school. These findings were consistent with the wider reporting of "a significant deterioration of facilitates and social amenities in rural areas, a spiralling level of unemployment and a degraded quality of life for rural inhabitants" since independence (Shedenova and Beimisheva 2013: 586). The lack of nurseries were noted as a particular problem

faced by female respondents, reflecting cutbacks in subsidised state-provided services during the post-Soviet transition as has been documented elsewhere (see, for example, Werner 2000; McCann 2007; Stawkowski 2017).

Knowledge of earthquake and landslide hazard, and perceptions of risk

Environmental hazards, including earthquakes and floods, were identified as a difficulty faced by a small number of respondents only. However, when asked about hazards and risks directly, the hazards causing the greatest concern were earthquakes (92 respondents), floods (72 respondents) and mudflows (42 respondents). Earthquakes were of greatest concern to people in Atbulak (26 respondents) and Turbat (20 respondents); floods in Kelte Mashat (21 respondents) and Mashat (20 respondents); and mudflows in Burguluk and Turbat (12 respondents respectively). These concerns resonate with the observations of physical risks summarised by the natural scientists in Table 1. Overall, 53 of the householders sampled responded with either "no hazards faced", "don't know" or "no response".

Of the 302 survey respondents, only 89 had experienced an earthquake. This reflects, at least in part, the seismic profile of Kazakhstan with infrequent, high magnitude events punctuated by long periods of low-level seismicity. Those participants who had experienced an earthquake reported "average tremors [of] III-IV MSK" which caused fixtures and fittings in their homes to move and, in larger events, caused cracks to appear in their houses.[11] As one village elder explained: "We have earthquakes. I have witnessed a 4.5 earthquake. No more than that. The epicentre was far away in the mountains... It wasn't scary. Nobody suffered" (Elders FGD, Turbat 16 March 2016). A woman in the same village even concluded: "This is not a seismic zone" (Women FGD, Turbat 18 March 2016). In most cases, the tremors reported had occurred a few years previous to the survey, suggesting the infrequency of their occurrence or, if felt, whether they were even remembered by householders. One respondent dismissively commented that "there were minor tremors 4-5 years ago...lightbulbs were shaking". Just under half the respondents who had experienced an earthquake lived in Atbulak and Turbat, communities located close to the mountains where tremors may be felt more frequently and intensely due to their proximity to an active fault.

In terms of the perceived risk of earthquakes, only 86 respondents thought that an earthquake was possible, while 208 respondents did not perceive any threat from them or simply had no view on the matter. Of the 86 respondents who thought an earthquake might occur, just over half believed that an earthquake could happen at any time, 21 respondents considered that an earthquake was possible but not any time soon, and 19 respondents had no opinion as to when the earthquake might happen. Given this experience of mainly small tremors, most respondents were not unduly alarmed by the prospect of an earthquake: 31 respondents considered that any future earthquake would be small in size resulting in only slight ground movements without any real damage; and a further 27 respondents thought that a future earthquake might cause damage to buildings and farmland. Only 7 respondents anticipated an event with the potential to cause injury or loss of life. These attitudes are reflected in the respondents' level of concern, with 51 respondents claiming that they were unconcerned about earthquakes, 77 respondents that they were slightly concerned, and

[11] MSK or the Medvedev-Sponheuer-Karnik scale is a macro-seismic intensity scale used to evaluate the severity of ground shaking from observed effects. The MSK scale has 12 intensity degrees from MSK I - Not perceptible to MSK XII -

only 12 respondents, expressing any real concern that an earthquake might happen. Overall, perceptions of risk were found to be reasonably consistent across the six case study communities.

Fewer householders had direct experience of landslides or debris flow hazards (65 respondents), with experience of landslides being highest in the community of Turbat (20 respondents), which is surrounded by fairly steep slopes in loess-like material susceptible to rainfall and earthquake-induced landslides. Respondents recalled landslides that occurred in 1969 and 1977 linked to earthquakes ("when the mountains moved") but most landslides were linked to snowmelt and spring floods which cause mudflows and had, in the past, resulted in the death of livestock. In some cases, it was unclear if the respondents were referring to a mudflow or a flood, or perhaps a muddy flood, which can occur when heavy rain washes over agricultural land, and which is a common hazard in loess.

When asked directly if they were concerned about landslides or floods when earthquakes occur, 71 respondents said yes. As one respondent in Turbat explained: "Our place is mountainous. Thus landslides are inevitable [when earthquakes occur]" (Elders FGD, Turbat 16 March 2016). In terms of potential impacts, respondents mentioned loss of livestock, reduction in the harvest, and damage to people's houses. However, 155 respondents did not consider landslides and floods a concern in the event of an earthquake, reflecting perhaps a lack of direct experience of high magnitude earthquakes which have the potential to trigger secondary hazards such as landslides or floods. Just under 20 % (58 respondents) have experienced other hazards, mainly floods. Reference was made to a flood in 1958 which destroyed houses, and in 1967 or 1968 when a bridge was swept away and livestock died. More recent floods were noted in Burguluk when the bridge at the entrance to the village was destroyed in 2005, prompting a resident to comment how "[the] mountains are close; the whole settlement will be washed away". These sentiments were echoed in discussion with the village elders in Turbat who confirmed that "floods are happening here often" and who observed that "in such situations there is a huge flow from the mountains which can carry a person with it. It can even carry a horse. The water level grows up to one and a half metres and the flow is very strong – a boat won't help" (Elders FGD, Turbat 16 March 2016).

Earthquake preparedness

Only 55 respondents reported that they had received guidance on how to prepare for an earthquake or what to do when an earthquake occurs. There was little difference between men and women in this respect, with 28 male respondents and 26 female respondents reporting that they had received guidance. These findings contrast to other published studies on gender and disasters which suggest that in patriarchal societies, women are less likely than men to have access to information prior to an earthquake (Halvorson and Hamilton 2007). Once again, we surmise that this may be a legacy of the Soviet Union and reflects efforts to "emancipate" women by providing greater access to education and employment opportunities in the USSR (Werner 2003). Perhaps surprisingly, 26 of the participants who reported having received guidance were aged between 35 and 54 years. Given the emphasis on providing earthquake training through schools, the proportion of younger respondents (less than 35 years) who had received such training (8 respondents) might have been expected to be higher. Information sources on earthquakes were varied and included community leaders, newspapers, the television, and leaflets and posters. Overall, the high number of respondents who reported not receiving guidance (201 respondents) reflects the Ministry of Emergency Situations concerns, as expressed in their mid-term review to the HFA, that the absence of public education

campaigns for enhanced awareness of risk or information on DRR practices at the community level in Kazakhstan (MoES 2013).

Given the low levels of earthquake risk awareness among the survey respondents, and the low level of risk reduction guidance received, it is perhaps unsurprising that only 18 respondents had taken any steps to prepare for an earthquake at the individual or household level. Householders who had taken steps focused mainly on improving the structural features of their homes, including the construction of houses with bond beams (a horizontal structural element embedded in a masonry wall) and concrete foundations.

Responsibility for, and willingness to engage in, earthquake risk reduction

In terms of roles and responsibilities for ERR, 292 respondents identified householders as responsible for making their own homes earthquake safe. Owner-constructed houses were the norm across the six communities, with 94 % of homeowners (279 respondents) building their houses themselves. Most houses were single storey (258 respondents), with just over 40 % (131 respondents) of houses constructed from mud brick (adobe), 22 % (66 respondents) constructed from clay bricks, 16 % (49 respondents) from fired brick, and 10 % (29 respondents) from breeze blocks. Other materials used included reeds, a traditional building material, which were more common in older properties. The dominant roof material was slate (169 respondents), followed by tin (83 respondents) and metal tiles (35 respondents). When asked if their homes were capable of withstanding a strong earthquake (defined here as an earthquake between MSK VII-IX), more than half the respondents were uncertain (160 respondents).[12] Just 20 respondents considered their homes able to withstand an earthquake of this order with no damage, and 46 respondents with some damage. Analysed by gender, more women than men were unsure if their house was strong enough to withstand a high magnitude earthquake (58 % and 49 % respectively). These findings are of particular concern given the extensive collapse of residential houses of similar typology to those in rural areas of Turkistan Oblast during the Ms 5.4 Lugovskoy earthquake in neighbouring Jambyl oblast in 2003 (IFRC 2003), with the housing stock described as being in a 'deplorable condition' (UNDP 2004: 7).

Only 67 respondents were aware of practices, guidelines or regulations to make their houses more resistant to earthquakes. Some variation in responses based on gender was noted in this respect, with 52 male respondents declaring that they were aware of such guidelines and practices compared to 15 women. A common response from female respondents was simply "My husband knows" or "My husband decides". The main seismic feature cited by respondents was bond beams, followed by reinforced concrete pillars and walls, and strong basements (foundations). To better withstand earthquakes, structures need to be built to be resistant to sideways loads: walls must go equally in both directions, they must be strong enough to take the loads, they must be tied in (bonded) to any framing and reinforced to take load in their weakest direction. It was noted, too, that more modern houses commonly have concrete foundations up to 90 cm in depth with a full 40 cm in the ground (Interview with Elder, Turbat 20 March 2016). According to the respondents across the six communities, however, only 44 % of houses (134 respondents) had been checked by officials to see

[12] MSK VII. Very strong – Serious damage to older buildings, masonry chimneys collapse, small landslides are triggered. MSK IX. Destructive – General panic, substandard structures collapse, substantial damage to well-constructed structures, ground fracturing and widespread landslides.

if they conformed to earthquake safe standards, 37 % (109 respondents) were unchecked, and 17 % (49 respondents) did not know whether their house had been checked or not[13].

Outside of the home, preparedness for earthquakes was overwhelmingly seen as a matter for the akimat. They were understood to be responsible for: roads and bridges (235 respondents); water, sanitation and electricity supplies (257 respondents); and hospitals, health posts and schools (236 respondents). Moreover, the stockpiling of community-level resources was regarded as the joint responsibility of the akimat (156 respondents) and the military (96 respondents), with very few people seeing a role for themselves or their community (28 respondents) in this activity. Providing information about earthquake risk was also viewed as the responsibility of the akimat (124 respondents), NGOs/international organisations (75 respondents) or the military (61 respondents).

When asked who people consulted if they had a problem, those surveyed overwhelmingly cited the akimat (125 respondents). This was followed by neighbours and relatives (21 respondents). Only six respondents mentioned the *biy*, a respected male elder appointed as a community arbiter by virtue of his experience, intelligence and knowledge of local traditions (Martin 2001:25-30).[14] Yet, in the discussions, it was apparent that men "never" approach the akimat directly but always "go through biys" (Interview with Imam, Tonkeris 2 July 2016) and that women only approach biys through their menfolk (Mixed Sex FGD, Tonkeris 6 July 2016). These findings indicate that elders play a more active role than the survey findings alone suggest. It is possible that the context in which the questions were asked in the survey skewed the answers here. Only 19 respondents differentiated between smaller problems to be solved within the household and bigger problems that were managed by the government.

Given the importance that respondents attributed to government in disaster preparedness and risk reduction, it is perhaps surprising that 63 % of those surveyed felt that households and communities received no or very little government support for ERR (144 respondents and 46 respondents respectively). These findings highlight a clear gap between government capacity and public expectation which is well recognised in Kazakhstan when it comes to addressing social problems (Olcott 2010). What was less clear, however, was whether respondents were concerned enough about earthquakes to hold government to account for their action and inaction.

In terms of actions to reduce individual or household level risk, 143 respondents were willing to take personal actions such as removing heavy objects from shelves, preparing an earthquake survival kit or a household response plan. Respondents were less willing to undertake actions that cost money,

[13] According to an interview with an architect in a quasi-government-private building institute in Taraz in August 2017, adobe buildings are in fact illegal in seismic regions in Kazakhstan, but this is not reinforced. As a result, there is no building code for adobe buildings so builders often used the guidelines for fired bricks. Drawings are often approved on the basis that the house will be constructed from fired brick.

[14] Traditionally, communities preferred to settle disputes between members by approaching a respected member of the community to adjudicate disputes in such a manner as "to come to a peaceful decision" (Elders FGD, Tonkeris 2 July 2016).

for example, taking out household insurance (61 respondents)[15] or retrofitting their own home (48 respondents). They were even less willing to assist in the development of a community disaster management plan (30 respondents). As emerged in FGD discussions, however, it was clear that some people did seriously consider hazards (admittedly mainly floods) when it came to choosing the location of their homes with a clear preference for building higher up the slope "as it is the safest place" and that "it is dangerous to build a house at the bottom" (Women FGD, Turbat 16 March 2016; Interview with Elder, Turbat 20 March 2016). The key barriers that respondents said they faced in increasing their resilience to earthquakes were a lack of funds/financial support (181 respondents), lack of technical knowledge (38 respondents), lack of time (33 respondents), lack of community cohesion (26 respondents), lack of interest (17 respondents), and other more important concerns (9 respondents).

Only four respondents reported that there were informal groups or committees active at the community level dedicated to making the community safer from disasters such as earthquakes. Those who responded in the affirmative cited school committees and the government's Emergency Situations Department. We uncovered no indication in the six target communities of an informal group or association specifically organised to better prepare people to deal with hazards or manage one should one occur, despite repeated probing in FGDs. However, it is possible that the question was misunderstood as community hazards are frequently considered alongside a range of other community problems. Western social scientists too often seek to uncover more mono-purpose associations and networks in relation to community welfare according to their own criteria of what such organisations should look like and therefore fail to recognise the existence of other more multi-purpose ones that do not share the same outward form but may fulfil many of the same functions (Bankoff 2007:330).

The apparent absence of community-wide engagement for earthquake risk reduction is perhaps unsurprising given the generally low priority accorded to earthquake risk. However, the survey findings did highlight the presence of social networks and systems of reciprocity across the six communities. Just over 50 % of survey respondents had participated in *asar* (a form of reciprocal self-help between family, neighbours and friends) used extensively to construct houses, build schools, make fuel from dried animal dung, and to collect hay (Bankoff and Oven 2019:13). It is well documented that people were used to working together to achieve shared goals under the Soviet system (Interview with Imam, Tonkeris 2 July 2016; Van Assche et al. 2014). Asar (*ashar*) remained a common practice throughout the Soviet period all over Central Asia (Giffen et al 2005:64). According to Kuehnast and Dudwick, "The elaborate system of Soviet collectivized agriculture often grouped extended families and clan groups together, thereby reinforcing kinship networks by ensuring that their members lived and worked in the same location" (2004:3). While such traditional networks continued to play an important role in rural areas throughout the Soviet period, they became more

[15] A study on disaster financing by the OECD (2015) suggests that low insurance rates of houses is not uncommon in countries with similar levels of economic development to Kazakhstan. In Portugal, for example, the earthquake insurance penetration rate remains very low, with just 16% of households insured against earthquake risk. In Mexico, the figure is lower still at less than 5%. Hungary, by comparison, has a well-developed system of insurance covering all disaster risks including earthquakes and landslides, with a 75% penetration rate.

active “during the difficult years, when the ‘Soviet era’ economy was collapsing...[to] complement or substitute the lack of financial or material resources, in terms of the market economy and the reduced social assistance provid[ed] by the state” (Shedenova and Beimisheva 2013: 588-9). These traditional networks may not be specifically organised around ERR reflecting, perhaps, the low level of perceived risk and the perceived role and responsibility of the state in earthquake preparedness at the community level. However, they are often actuated in times of threat to the community such as fires or floods, and undoubtedly have the potential to facilitate more bottom-up, community level planning (Elders FGD, Kelte Mashat 30 June 2015).

Discussion

Risk perception is not an actual calibration of probabilistic risk (i.e. “real risk”) but a measure of how people envisage risk in terms of their attitude, cognition and vulnerability (Slovic 1987). In a country like Kazakhstan, where the probabilistic risk of a major earthquake is high but the level of perceived risk is relatively low, there is cause for concern. This state of affairs is not unexpected given the particular seismic profile of the country with infrequent, high magnitude earthquakes punctuated by long periods of low-level seismicity. The absence of a major earthquake in the last century has encouraged a false sense of security and complacency among people, the sort of attitude as expressed in statements such as “earthquakes are very rare and, when they happen, they are very slight” or “there are no earthquakes in this place – never” (Mixed Sex FGD, Turbat 6 July 2016). Nor are Kazakhs alone in this respect. Much the same findings have been found in Portugal where “the absence of a dramatic earthquake...for a long time might contribute to the low seismic risk preparedness among the general public” (Vicente 2014:272). This has important implications as it is easier to increase awareness and preparedness in societies which have more recently experienced the hazard in question than in societies that have not.

While the results of the 302 surveys and 10 FGDs in six villages in Turkistan oblast are not unexpected, they are nonetheless revealing and confirm the need both to more fully consider rural areas in ERR policies and to take seriously earthquake adjustment education in the countryside. Unlike Almaty, where 93 % of residents overwhelmingly rated earthquakes as the risk they feared the most (Mussakulova 2017:210), our research shows that villagers demonstrate little awareness of earthquakes or concern about the potential occurrence of a high magnitude earthquake in the future. The reasons behind this marked difference in attitudes are complex. It cannot be solely attributed to a lack of direct experience of even small earthquakes as this is common to both urban and rural populations. Numerous studies link a realistic perception of risk to direct (or indirect via the media) experience of hazards (Sjöberg 2000:2). In the case of earthquakes, Slovic et al (1974) observe how people can “misperceive” risks, underestimating the probability of one happening or even denying that there is any risk at all. Often this denial takes the form of a claim to be less at risk than others, an “unrealistic optimism” or “optimistic bias” whereby it is always somebody at a distance that needs to worry and not the speaker (Sjöberg 2000:2; Witte et al. 2001). As one focus group participant explained: “I heard that there were some [earthquakes] in Shymkent or Tashkent but not here” (Mixed Sex FGD, Turbat 6 July 2016). In the surveys, too, a small number of respondents explained that “tremors come from Kyrgyzstan”. While this exhibits some awareness that the shaking associated with, and the impacts from, an earthquake can be felt tens to hundreds of kilometres from its epicentre, it also effectively locates the places at risk somewhere else. Even the choice of respondents to answer the survey questions in Russian, when overwhelmingly the

population is ethnically Kazakh, may instinctively express a subconscious impression among villagers that earthquakes are external to their community and risk preparedness a foreign problem, one primarily for city dwellers, scientists and government officials and not a predicament they face.

However much the absence of direct experience of a major earthquake may condition the level of risk perception, there are other factors at work to explain why rural people are not overly concerned about their occurrence and do little to prepare for one. Mussakulova (2017) explains the lack of risk preparedness among Almaty residents (despite the high perceived risk) as a legacy of the Soviet period and a paternalistic view of the state that invests "authorities" with the sole responsibility for people's protection. Moreover, state attempts to hide the degree of risk from its citizens to prevent panic and to conceal its own limited capacities only serve to increase people's carelessness about their own welfare and the safety of the buildings they live in. People were also fatalistic, trusting in God to protect them and to justify their own inactivity. Finally, she attributes the low level of preparedness to a question of priorities and preoccupation with providing one's daily needs (Mussakulova 2017:225-226). There is some evidence in our research to support these findings. Rural residents clearly entrusted the state (the akimat and the army) with community preparedness. Villagers, too, had more pressing matters to think about in their day-to-day existence than earthquakes and were much more concerned by the poor quality of roads, inadequate water provision, the extension of gas to their community, and limited employment opportunities than they were with preparedness for what was generally perceived as a remote possibility.

Some villagers were also reassured by belief in divine protection, although this was not discussed as much as we might expect given the oblast's long Islamic history and the 'distinctive theological perception of natural hazards in Islamic thought' (Chester et al. 2013: 278). This perhaps reflects the legacy of atheism under the Soviet Union and a strong belief in scientific prediction, although this by no means eradicated religious thought or practice. As one lady described her fellow residents to us, somewhat dismissively: "They believe in supernatural power that helps them and they don't have problems with nature that's why. The power comes from saints who lived here before them" (Women FGD, Turbat 18 March 2016). While it is unclear which saints the respondent was referring to specifically, this may indicate the presence of Islamic Sufism or mystical Islamic belief within the case study communities which has been documented elsewhere in southern Kazakhstan (Muminov 2018). The notable absence of divine explanations however perhaps supports the findings of Chester et al. (2013) that while earthquakes in Islamic countries may be explained in religious terms, 'there is little evidence to suggest that this inhibits the introduction of programmes of planned loss reduction' (p. 278). This does, however, require more detailed investigation.

But there were notable differences as well. Few rural residents have received guidance on how to prepare for, or respond to, earthquakes, whether state-directed or from some other external source. Indeed, it was only due to our research team in certain villages that the Red Crescent established initial relations with these communities. Lack of public information may have been partly responsible for the low levels of awareness and lack of preparedness among community members. "We live, work and look after our children", one woman said, "and our fault is that we never look for information on the internet about what can happen and how to prepare" (Women FGD, Turbat 18 March 2016). Unlike their urban counterparts, too, rural residents appeared more willing to take steps to prepare their homes and families against untoward events, taking precautionary measures to reduce the level of risk. Respondents saw themselves as responsible for making their own homes

safe from earthquakes in terms of how they were constructed and maintained -- though any wider DRR preparedness was understood as the role of government and, to some extent, the military. At the same time, though, many people were critical of the support they receive from government and were apprehensive regarding what to expect in the event of an earthquake. Traditional forms of reciprocal labour exchange and reciprocity known as *asar*, unknown in the city, also continued to play an important role in village society, providing a potential informal infrastructure for more community-based ERR as witnessed by its efficacy in fighting fires and dealing with floods (Bankoff and Oven 2019:12-13).

These findings have important implication for the implementation of ERR policies in rural areas of Kazakhstan. According to Halvorson and Hamilton, "the mitigation of future earthquake disasters in many parts of Central Asia is linked to cultivating a climate of public participation" (2007:329). How to achieve this desirable outcome, however, is another matter. It is commonly believed that understanding people's perceptions of risk is necessary to develop effective information risk communication strategies (Vicente 2014:274). Yet as a recent review of the literature suggests, the relationship between risk perception, willingness to act and risk preparedness is not straightforward; there is no direct correlation between risk perception and preparedness actions. In the first place, it seems that the perceived likelihood or magnitude of a hazard does not have a significant effect on how people perceive risk. Nor, apparently, do personal factors necessarily exert a consistent effect on risk perceptions (Wachinger et al. 2013). Individual studies do, however, show that certain personal factors are significant to specific hazards, such as gender in earthquakes (Kung and Chen 2012), home ownership in floods (Penning-Rowsell 2011), or even culture to certain religions (Paradise 2005; Ainuddin et al. 2014).

The only consistent factor that scholars have identified as having a significant effect on influencing people's perception of risk is their direct, personal experience of hazard. Even this, however, can have both positive and negative effects, positive in the sense of heightening risk perceptions if a person's property is adversely affected, or negative in terms of creating a false sense of complacency if a person emerges largely unscathed from previous events. Wachinger et al. suggest three possible reasons for the weak relationship between risk perception and personal actions, what they term the "risk perception paradox": first, that individuals understand the risk but choose to accept it due to other perceived benefits outweighing the potential negative impacts; second, that individuals understand the risk but have transferred all responsibility for action to somebody else, and so do not take any actions themselves; and third, that individuals understand the risk but have few resources with which to change their economic and personal circumstances (Wachinger et al. 2013:1054).

As regards rural communities in Turkistan oblast, we found evidence of all three reasons at work in why people neither take the risk of earthquakes seriously nor do anything much about reducing its potential effects. The survey findings suggest that there is an absence of local knowledge (or a seismic culture) which might be expected to develop when earthquakes occur more frequently (see, for example, Bankoff 2002). There has not been a significant earthquake in living memory in the oblast and the 1966 Tashkent earthquake (which was certainly remembered by older people) and the moderate 2003 Lugovskoy earthquake in neighbouring Jambyl oblast appear to have had limited impact on people's perceptions of their own vulnerability/resilience. In fact, the (reasonably) high frequency but low magnitude seismic activity in the region breeds a certain complacency among

local people. Most people believe that they are safe. “They don’t remember any floods or landslides” is a common refrain and FGDs frequently began with the assertion, acknowledged by others in the group, that “life is good here” (Women FGD, Turbat 18 March 2016).

There is also the legacy of the Soviet Union. Education levels are high amongst both men and women even in rural areas. Natural hazards are on school curricula but the focus is more on the roles and responsibilities of government agencies, reflecting how disasters were managed prior to 1991, and neglecting the importance of community resilience and the social dimensions of disasters. In particular, there is little consideration of how to engage women in DRR or of their essential contribution to both the household and the community. The agency entrusted with response to large-scale emergencies in the USSR was the Civil Defence Force whose troops and paramilitary units were deployed on such occasions. These emergencies were mainly conceived of in terms of military threats (Gouré 1986). There were no national specialised rescue units in the Soviet Union until Mikhail Gorbachev created a State Commission for Emergency Situations to organise disaster management and coordinate emergency response in July 1989 as a last-ditch attempt “to retain federal executive functions in a disintegrating union” (Elie 2013:215). Community-based DRR, therefore, remains largely an alien concept among government bureaucrats and rural people alike. The potential to work through traditional social structures in rural communities is often overlooked (e.g. *asar*). Indeed, our own experience working with the Red Crescent highlighted some gaps even among civil society organisations in their understanding of contemporary rural Kazakhstan and the most effective way to engage rural communities in earthquake preparedness and risk reduction. However, the fact that most homeowners feel primarily responsible for ensuring the seismic safety of their own houses may offer a promising means of encouraging deeper community engagement in ERR if approached in the right manner.

As Paul and Bhuiyan have pointed out in their study of seismic risk preparedness in Dhaka City, cost can be a key element in whether people embrace innovation and adapt their behaviour (2009:344). Despite generally favourable social economic conditions in rural communities, where most respondents self-ascribe as comfortably off, still just under 20 % of respondents describe themselves as “needy”. Problems remain regarding lack of employment opportunities and access to basic services (drinking water and gas). While Kazakhstan’s economy has experienced unprecedented growth rates, averaging 6 % per annum between 1996 and 2013, and the population below the poverty line has declined significantly, high levels of income inequality remain visible, especially in rural areas (Agarwal 2007). Perceived cost also remains a key barrier to earthquake preparedness at the household level in rural areas as Soviet-style economic egalitarianism has given way to more conspicuous inequality (Shahbaz et al. 2017). The role of the state and its willingness to subsidise ERR measures at the local level will be a key factor at work here.

Conclusion

Trained as we are in Western liberal social sciences, we approached this research from a perspective that unquestionably accepted that community-based DRR provides the model for increasing people’s resilience to disasters and lowering their levels of risk. Such approaches seek to reduce vulnerability by responding to local problems and needs, building on local knowledge and expertise, and strengthening communities’ capacities to prepare and respond (Wisner 2006). All too often, however, “people’s sense of themselves and their place is often in friction with how resilience planners imagine they might foster social capital and harness networks into their own disaster risk

management scheme" (Nightingale 2015: 183). We were therefore looking for signs of community networks that might provide a framework for collective DRR action, examining in turn the efficacy of clan affiliation (zhuz), customary leadership (biy) and reciprocal forms of labour exchange (asar). We found evidence of all three at work in village communities and exerting varying degrees of influence on people's lives, according to age, location, and activity. Stawkowski clearly shows the continuing importance of community networks in Kazakhstan and how the residents of Koian, a village bordering on the Semipalatinsk Nuclear Test Site, have reinvented themselves as a collective commune in the post-Soviet period (Stawkowski 2017). Humphreys refers to such cooperative enterprises as "neo-socialist corporations" where everyday life continues to be governed more by what is best for the village and less on maximising individual profits (Humphrey 2002).

Even with the presence of these networks, however, the low level of awareness of earthquake risk and the low priority accorded to risk reduction by communities themselves, as well as the lack of state support which is essential for effective community-based DRR, has led us to question whether this is the most appropriate model for rural Kazakhstan? Given the distinctive history of the region, the country's incorporation within the Soviet Union for approximately 70 years, and the degree with which trust continues to be reposed in state structure such as the akimat, would a more authoritarian, top-down model centred, for example, on building codes and insurance, be more appropriate in the present circumstances? Of course, enforcing the rights of the community over the individual is also a form of collective authoritarianism, one sanctified by historic tenets of Soviet law. On the basis of the research we conducted, however, there is insufficient evidence to determine such an important issue, though we deem that the matter merits serious consideration.

What is clear, however, is that rural Kazakhstan should not be neglected; it is important to understand the attitudes and concerns of rural as well as urban populations. Even if there is a somewhat problematic relationship between risk perception and adaptive behaviour, what people think about earthquakes is an important starting point for all DRR communication and education. This is all the more important in rural areas where the government's presence is least felt, and the media penetration is lowest. Our study of six rural villages in Turkistan oblast, a highly seismic region where a large magnitude earthquake can be expected, reveals how unprepared residents will be when one occurs, and the extent of social vulnerability in these communities. The main challenge facing ERR in Kazakhstan is how to raise people's awareness and make them more resilient even if they do not consider themselves to be in danger but are.

The exten to which Kazakhstan, too, constitutes part of a distinctive geopolitical and cultural region that has been unquestioningly subsumed into the global South without regard to its distinctive Soviet legacy, as we have advocated elsewhere (Bankoff and Oven 2020), raises some fundamental questions about how to increase community resilience and what constitutes the most appropriate model for ERR in rural areas. While we recognise the historical diversity within the former Soviet bloc, we maintain that the region does retain a distinctive geopolitical and cultural commonality that is a direct legacy of the USSR. As we have shown, too, this legacy has unfortunate implications for rural areas, both in terms of how earthquake risk is perceived locally and as regards the national and international neglect of rural areas.

References

Abashin, S. (2014) Ethnogenesis and Historiography: Historical Narratives for Central Asia in the 1940s and 1950s. In Cvetkovski R. and Hofmeister, A. (eds), *An Empire of Others: Creating Ethnographic Knowledge in Imperial Russia and the USSR*. Budapest: Central European University Press., 145-169.

Agarwal, P. (2007) Economic growth and poverty reduction: Evidence from Kazakhstan. *Asian Development Review* 24(2): 90–115.

Ainuddin, S., Routray, J.K. and Ainuddin, S. (2014) People's risk perception earthquake prone Quetta city of Baluchistan. *International Journal of Disaster Risk Reduction* 7:165-175.

Andreev, E.M., Darskiy, L.E. and Khar'kova, T.L. (1993) Naselenie Sovetskogo Soyuza: 1922-1991 [Population of the Soviet Union 1922-1991]. Moskva, "Nauka".

Armaș I. (2006) Earthquake risk perception in Bucharest, Romania. *Risk Analysis* 26(5): 1223-1234.

Ball, L. and Caddick, H. (2016) Earthquake science and hazard in Central Asia - Conference summary. ODI Report. London: Overseas Development Institute. https://www.odi.org/sites/odi.org.uk/files/resource-documents/11151.pdf

Bankoff, G. (2007) Dangers to going it alone: social capital and the origins of community resilience in the Philippines. *Continuity and Change* 22(2): 327–355.

Bankoff G. and Oven, K. (2019) From nomadic communitarianism to civil socialism: searching for the roots of civil society in rural Kazakhstan. *Journal of Civil Society* 15 (4): 373-391.

Bankoff, G. and Oven, K. (2020) What happened to the Second World? Earthquakes and postsocialism in Kazakhstan. *Disasters* 44(1): 3-24.

Bankoff, G., Cannon, T., Kruger, F. and Schipper, L.F. (2014) Introduction. Exploring the links between cultures and disasters. In Kruger, F., Bankoff, G., Cannon, T., Orlowski, B., Schipper, L.F. (eds) *Cultures and Disasters: Understanding Cultural Framings in Disaster Risk*. London and New York: Routledge.

Bershidsky, L. (2015). Kazakhstan is the latest oil-curse casualty. *Bloomberg View* 20 August. Available at: http://www.bloombergview.com/articles/2015-08-20/kazakhstan-is-the-latest-oil-curse-casualty (accessed on 20 January 2016).

Bohr, A., Brauer, B., Gould-Davies, N., Kassenova, N., Lillis, J., Mallinson, K., Nixey, J and Satpyev, D. (2019) Kazakhstan: Tested by Transition. London: Chatham House Report. https://www.chathamhouse.org/sites/default/files/2019-11-27-Kazakhstan-Tested-By-Transition.pdf (accessed 31 July 2020).

Bilham, R. (2009). The seismic future of cities. *Bulletin of Earthquake Engineering* 7: 839-887.

Bogdanovitch, K. I., Kark, I. M., Korolkov, B. Y. and Mushketov D. I. (1914) The earthquake in the Northern Districts of the Tien Shan, 22 December 1910 (4 January 1911). *Transactions of Geological Committee*, St. Petersburg 89: 270 [in Russian].

Bronfman, N. and Cifuentes, L. (2003) Risk perception in a developing country: the case of Chile. *Risk Analysis* 23(6):1271-1285.

Chester, D.K., Duncan, A.M. and Al Ghasyah Dhanhani, H. (2013) Volcanic eruptions, earthquakes and Islam. *Disaster Prevention and Management* 22(3): 278-292.

Collins, K. (2006) *Clan Politics and Regime Transition in Central Asia*. Cambridge: Cambridge University Press.

Covello, V. T. (2010) Strategies for overcoming challenges to effective risk communication. In Heath, R.L. and O'Hare, H.D. *Handbook of Risk and Crisis Communication*. New York: Routledge, 143-167.

Coumel L. and Elie, M. (2013) A belated and tragic ecological revolution: nature, disasters, and green activists in the Soviet Union and the post-Soviet states, 1960s-2010s. *The Soviet and Post-Soviet Review* 40 (2): 157-165.

Cummings, S. (2005) Kazakhstan: Power and the Elite. London: I.B. Tauris & Co.

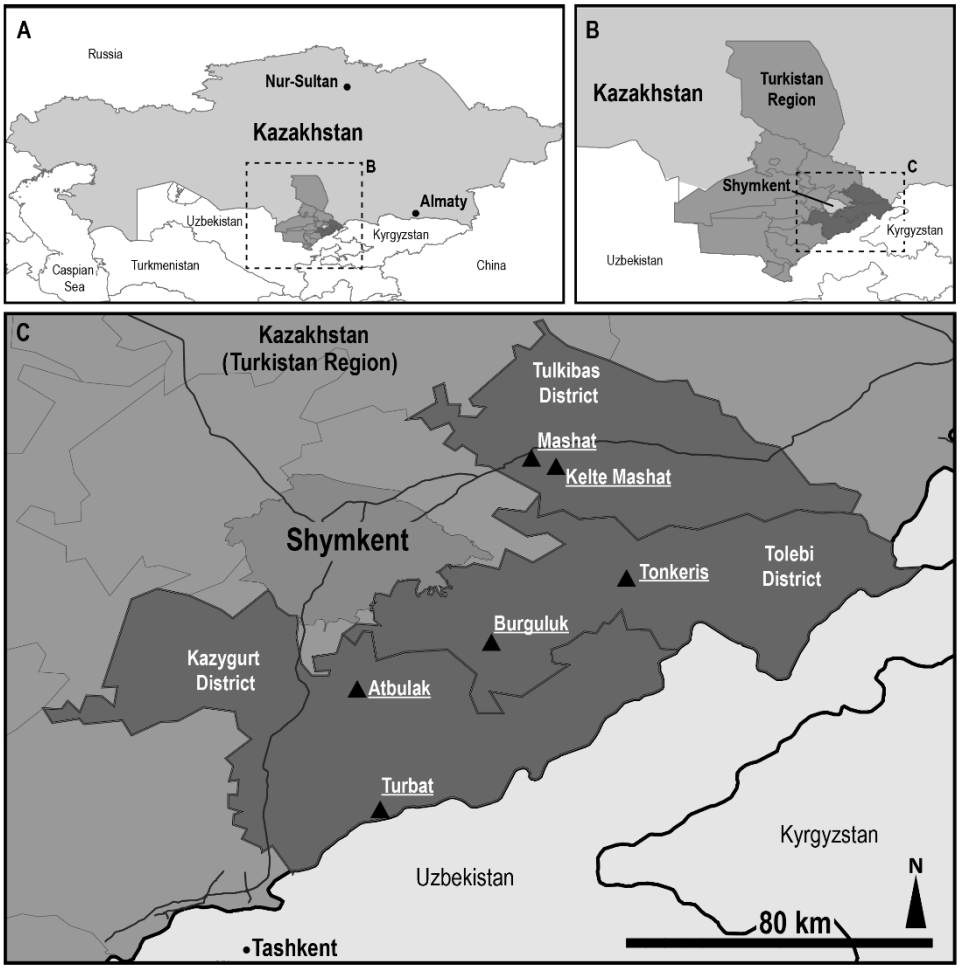
Doose, K. (2017) Spitak – the last petrified Soviet utopia. In Harutunyan, T. (ed.), *Yerevan. An Architecture Guide*. Berlin: DOM Publishing House, 265-289.

Doose, K. (2018) The Armenian earthquake of 1988: a perfect stage for the Nagorno-Karabakh conflict. *Europe-Asia Studies* 70 (6): 924-941.
Douglas, M. (1966) *Purity and Danger, an Analysis of Conceptions of Pollution and Taboo*. London, Routledge and Kegan Paul.
Douglas, M. and Wildavsky, A. (1983) *Risk and Culture: An Essay on the Selection of Technological and Environmental Dangers*. London, University of California Press.
Eicher, S. (2004) Is Kazakhstan a market economy yet? Getting warmer… William Davidson Institute, University of Michigan Business School, Working Paper Number 673, April 2004. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=539702 (accessed 31 July 2020).
Elie, M. (2013) Late Soviet responses to disasters, 1989-1991: A new approach to crisis management or the acme of Soviet technocratic thinking?" *The Soviet and Post-Soviet Review* 40: 214-238.
England, P. and Jackson, J. (2011) Uncharted seismic risk. Commentary. *Nature Geoscience*, 4 (June 2011): 348-349.
Erdik, M. and Durukal, E. (2008) Earthquake risk in its mitigation Istanbul. *Natural Hazards* 44:181-197.
Gamburtsev, G. A. (2013) History of experimental seismology in the Soviet Union. *Seismic Technology* 10(2): 1-8.
Gellner, E., Akhmanova, O., Bessac, F. B., Bromley, Yu. V., Dragadze, T., Dunn, S. P., Fischer, J. L., Halpern, J., Krader, L., Lewis, E. G., MacConaill, M. A., Makarius, R., Newcomer, P.J., Pershitz, A. I., Petrova-Averkieva, J. P., Sadomskaya, N., Semeka-Pankratov, E., Semenov, Yu. I. and Shimkin, D.B. (1975) The Soviet and the savage [and comments and replies]. *Current Anthropology* 16 (4): 595-617.
Giffen, J., Earle L. and Buxton, C. (2005) *The Development of Civil Society in Central Asia*. Oxford: INTRAC.
Gouré, L. (1986) *Civil Defence in the Soviet Union*. Westport, CT: Greenwood Press.
Halvorson, S.J. and Hamilton, J.P. (2007) Vulnerability and the erosion of seismic culture in mountainous Central Asia. *Mountain Research and Development* 27(4): 322-330.
Hand, E. (2015) Why the Nepal earthquake was far less damaging than feared. *Science*, August 6 2015. http://www.sciencemag.org/news/2015/08/why-nepal-earthquake-was-far-less-damaging-feared
Hann C. M. (Ed.) (2002) *Post Socialism: Ideals, Ideologies and Practices in Eurasia*. London and New York: Routledge.
Hann, C., Humphrey, C. and Verdery, K. (2002) Introduction: postsocialism as a topic of anthropological investigation. In Hann C. M. (Ed.) *Post Socialism: Ideals, Ideologies and Practices in Eurasia*. London and New York: Routledge, 1-28.
Havenith, H-B. and Bourdieu, C. (2010) Earthquake-induced landslide hazards in mountain regions: a review of case histories from Central Asia. *Geologica Belgica* 13, 3: 137-152.
Hinman, G. W., Rosa, E.A., Kleinhesselink, R.R. and Lowinger, T.C. (1993) Perception of nuclear and other risks in Japan and the United States. *Risk Analysis* 13:449-455.
Humphrey, C. (2002) *The Unmaking of Soviet Life: Everyday Economies after Socialism*. Ithaca & London: Cornell University Press.
IFRC (2003) Kazakhstan: earthquake information bulletin no. 1/2003. 28 May. https://reliefweb.int/report/kazakhstan/kazakhstan-earthquake-information-bulletin-n-1 (last accessed 30 July 2020).
Kahan, D. M., Jenkins-Smith, H. and Braman, D. (2011). Cultural cognition of scientific consensus. *Journal of Risk Research*, 14 (2): 147-174.
Kandiyoti, D. (1999) Poverty in transition: an ethnographic critique of household surveys in Post-Soviet Central Asia. *Development and Change* 30: 499-524. https://www.utsc.utoronto.ca/~kmacd/IDSC10/Readings/social%20surveys/survey%20crit.pdf

Karpowicz-Lazerg, C. and Mullet, E. (1993) Societal risk as seen by the French public. *Risk Analysis* 13:253-258.
Kavalski, E. (Ed.) (2010) *Stable outside, Fragile inside? Post-Soviet State in Central Asia*. Farnham: Ashgate.
King, S.A., Khalturin, V.I. and Tucker, B.E. (Eds) (1999) *Seismic Hazard and Building Vulnerability in Post-Soviet Central Asian Republics*. Dordrecht and Boston: Kluwer Academic .
Kondorskaya, N.V. and Shebalin N.V. (eds.) (1977) New Catalog of Strong Earthquakes in the U.S.S.R. from Ancient Times through 1977, NOAA National Geophysical Data Center Report SE-31, Boulder, Colorado, 1982. (Update and English translation of Noviy Katalog Sil'nykh Zemlyetryaseniy na Territoriy SSSR s Drevneyshikh Vremyen do 1975 g., USSR Academy of Sciences, Moscow, 1977), available at: http://earthquake.usgs.gov/learn/today/index.php?month=1&day=3&submit=View+Date (accessed 16 June 2016).
Kuehnast, K. and Dudwick, N. (2004) Better a Hundred Friends than a Hundred Rubles? Social Networks in Transition - The Kyrgyz Republic. *World Bank Working Paper no. 39.* Available online: https://elibrary.worldbank.org/doi/pdf/10.1596/0-8213-5898-7
Kulikova, G., and Krüger, F. (2015) Source process of the 1911 M8.0 Chon-Kemin earthquake: investigation results by analogue seismic records. *Geophysical Journal International* 201(3): 1891-1911.
Lapwood, E.R. (1970) Seismology in the Soviet Union. *Geophysical Journal International* 20: 207-222.
Li, T.M. (2014) *Land's End: Capitalist Relations on an Indigenous Frontier*. London: Duke University Press.
Martin, V. (2001) *Law and Custom in the Steppe: The Kazakhs of the Middle Horde and Russian Colonialism in the Nineteenth Century*. Richmond, Surrey: Curzon.
McCann, K.M. (2007). The shrinking of the welfare state: Central Asians' assessments of Soviet and post-Soviet governance. In Sahadeo, J .and Zanca, R. (Ed) *Everyday life in Central Asia. Past and Present*. Bloomington and Indianapolis: Indiana University Press, 233-247.
MFA (2018) Kazakhstan - Land of the Great Steppe: Regions. Ministry of Foreign Affairs Republic of Kazakhstan. http://mfa.gov.kz/mobile/demos/index_c11_en.html Accessed 31 July 2018.
Minority Rights Group International (2018) World Directory of Minorities and Indigenous Peoples: Kazakhstan, Uzbeks. https://minorityrights.org/minorities/uzbeks/ Accessed 10 October 2018
MoES (2013) *Kazakhstan: National Progress Report on the Implementation of the Hyogo Framework for Action (2011 – 2013)*. http://www.preventionweb.net/files/31269_kaz_NationalHFAprogress_2011-13.pdf Accessed
Molnar, P. and Ghose, S. (2000) Seismic moments of major earthquakes and the rate of shortening across the Tien Shan, *Geophysical Research Letters* 27, 16: 2377–2380.
Muminov, A. (2018) Sufi groups in contemporary Kazakhstan: competition and connections with Kazakh Islamic society. In DeWeese, D. and Gross, J. (Eds.) Sufism in Central Asia. New Perspectives on Sufi Traditions, 15th-21st Centuries. Brill, p. 284-298.
Mussakulova, M. (2017) L'analyse de la gestion du risque de laves torrentielles dans le contexte d'une ville soumise à de fortes contraintes environnementales et à des facteurs de vulnérabilité croissants: l'exemple de la ville d'Almaty (Kazakhstan). PhD., Université Lille - Sciences et Technologies.
Nurmagambetov, A., Mikhailova, N. and Iwan, W. (1999) Seismic hazard of the Central Asian region. In King, S.A., Khalturin, V.I. and Tucker, B.E. (Eds) *Seismic Hazard and Building Vulnerability in Post-Soviet Central Asian Republics*. Dordrecht and Boston: Kluwer Academic, 1-43.
ODI (Overseas Development Agency) (2016) *Earthquake science and hazard in Central Asia: conference summary*. London: Overseas Development Institute.
OECD (no date) Reforming Kazakhstan. Progress, Challenges and Opportunities. OECD Project Insights: https://www.oecd.org/eurasia/countries/OECD-Eurasia-Reforming-Kazakhstan-EN.pdf Accessed 27 July 2020.

OECD (2015), *Disaster Risk Financing: A Global Survey of Practices and Challenges,* OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264234246-en (accessed: 31 July 2020).
Okassov, S. (2013) *Kazakhstan: National Progress Report on the Implementation of the Hyogo Framework for Action, 2011-2013*. Available at http://www.preventionweb.net/files/31269_kaz_NationalHFAprogress_2011-13.pdf (accessed: 20 June 2016).
Paradise, T.R. (2005) Perception of earthquake risk in Agadir, Morocco: the case study from a Muslim community. *Environmental Hazards* 6: 167-180.
Paul, B. K. and Bhuiyan, R.H. (2010) Urban earthquake hazard: perceived seismic risk and preparedness in Dhaka City, Bangladesh. *Disasters* 34 (2): 337-359.
Penning-Rowsell, H.T. (2011) Victim pressure, institutional inertia and climate change adaptation: the case of flood risk. *Global Environmental Change* Part A 21(1): 188-197.
Petal, M., Baral, S., Giri, S., Rajbanshi, S., Gajurel, S., Paci Green, R., Pandey, B., Shoaf, K. (2017) Research Report. Causes of Deaths and Injuries in the 2015 Gorkha (Nepal) Earthquake. Save the Children, April 2017, Kathmandu.
Raab, N. (2014) The Tashkent earthquake of 1966: The advantages and disadvantages of a natural tragedy. Jahrbücher für Geschichte Osteuropas, Neue Folge, Bd. 62, H. 2: 273-294.
Raab, N. (2017) *All Shook up: The Shifting Soviet Response to Catastrophes, 1917-1991*. Montréal and Kingston, London and Chicago: McGill-Queens University press.
Robinson, T. (2018) Use of scenario ensembles for deriving seismic risk. *Proceedings of the National Academy of Sciences.* Doi: 10.1073/pnas.1807433115.
Rohrmann, B. (1994) Risk perception of different societal groups: Australian findings and cross-national comparison. *Australian Journal of Psychology* 46:150-163.
Schatz, E. (2004) *Modern Clan Politics: The Power of "Blood" in Kazakhstan and Beyond*. Seattle and London: University of Washington Press.
Shahbaz, M., Bhattacharya, M. and Mahalik, M.K. (2017) Finance and income inequality in Kazakhstan: evidence since transition with policy suggestions. *Applied Economics* 49(52): 5337-5351.
Shedenova, N. and Beimisheva, A. (2013) Social and economic status of urban and rural households in Kazakhstan. *Procedia - Social and Behavioural Science* 82: 585-591.
Sjöberg, L. (2000) Factors in risk response. *Risk Analysis* 20 (1): 1-11.
Slovic, P. (1987) Perception of risk. *Science* 236:280-285.
Slovic, P., Fischhoff, B., Lichtenstein, S., Corriga, B. and Combs, B. (2000) Preference for insuring against probable small losses: insurance implications, in Slovic, P. *The Perception of Risk*. London and Sterling: Earthscan, 51-72.
Slovic, P., Kunreuther, H. and White G.F. (1974) Decision processes, rationality and adjustment to natural hazards. In White, G.F.(Ed.) *Natural Hazards: Local, National, Global*. New York: Oxford University Press, 187-205.
Stawkowski, M. E. (2017) Life on an atomic collective. The post-Soviet retreat of the state in rural Kazakhstan. *Études Rurales* 200(2): 196-219.
Ulomov, V.I., Polyakova, T.P. and Medvedeva, N.S. (2002) On the long-term prediction of strong earthquakes in Central Asia and the Black Sea-Caspian Region. *Physics of the Solid Earth* 38(4): 276-290.
UN DESA (2015) World Urbanization Prospects: The 2014 Revision. New York: United Nations Department of Economic and Social Affairs Population Division, ST/ESA/SER.A/352.
UNDP (2004) Lessons from the Lugovskoy earthquake of 23 May 2003 for Kazakhstan. UNDP Kazakhstan and Ministry of Education and Science of the Republic of Kazakhstan, Almaty.
UN DRR (2019) New urban resilience programme for Central Asia. UNDRR update, 21 August 2019. https://www.undrr.org/news/new-urban-resilience-programme-central-asia. Accessed 27 July 2020.

Vicente, R., Ferreira, T.M., Maio, R. and Koch. H. (2014) Awareness, perception and communication of earthquake risk in Portugal: public survey. *Procedia Economics and Finance* 18: 271-278.
Viktorovich, I.Y. (2017) Implementation of the Sendai Framework for Disaster Risk Reduction in the Republic of Kazakhstan. Presentation given at the Asian Conference on Disaster Reduction (ACDR), 2 October 2017. https://www.adrc.asia/acdr/2017/documents/1-1%20Kazakhstan%20H.E.Mr.%20Yuriy%20Ilin,%20Deputy%20Minister,%20Ministry%20of%20Internal%20Affairs.pdf Accessed 27 July 2020.
Vorobiev, Y.I., N.I. Loktionov, M.I. Faleyev, M.A. Shakhramanyan, S.K. Shoygu, and V.P. Sholokh (1998) Disasters and Man: The Russian Experience of Emergency Response. AST-LTTE Publishers, Moscow.
Wachinger G, Renn O., Begg, C. and Kuhlicke C. (2013) The risk perception paradox – implications for governments and communication of natural hazards. *Risk Analysis* 33(6): 1049-1065.
Werner, C. (2000) A profile of rural life in Kazakhstan, 1994-1998: Comments and suggestions for further research. The National Council for Eurasian and European Research. https://www.ucis.pitt.edu/nceeer/2000_815-17g_Werner.pdf
Werner, C. (2003) 'Between family and market: Women and the new Silk Road in Post-Soviet Kazakhstan.' In Clark, G. (Ed.) Gender at Work in Economic Life. Alta Mira Press: 115-124.
Whiteshield Partners (2016) Sustainable development goals and capability-based development in regions of Kazakhstan. National Human Development Report 2016. file:///C:/Users/dgg3kjo/Downloads/NHDR%202016.pdf
WHO (2012) *Capacity of the Health System in Kazakhstan for Crisis Management*. Copenhagen: WHO Regional Office for Europe.
Witte, K., Meyer G., and Martell, D. (2001) *Effective Health Risk Messages: A Step-by-Step Guide*. London: Sage Publications.
World Bank (2018) Rural population (% of total population): World Bank staff estimates based on the United Nations Population Division's World Urbanization Prospects: 2018 Revision https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS
Wyss, M. (2018) Rural populations suffer most in great earthquakes. *Seismological Research Letters* https://doi.org/10.1785/0220180236
Ziegler, C.E. (Ed.) (2015) *Civil Society and Politics in Central Asia*. Lexington: University Press of Kentucky.
Zhovtis, E. (1999) Freedom of association and the question of its realisation in Kazakhstan, in M. Holt Ruffin, M.H. and Waugh D., (Ed.) *Civil Society in Central Asia*. Seattle and London: University of Washington Press, 57-70.



Map of Turkistan oblast showing the location of the six case study communities

Table 1: Summary of the geohazard context of the six case study communities

Turbat, Kazygurt District	A small town located near the border with Uzbekistan with a mosque, a number of shops and a market area. The close proximity of the town to the mountain front suggests that there may be active faults nearby and that the town may be susceptible to high intensity shaking. The river below the town is incised suggesting that flooding is unlikely. However, pluvial flooding has the potential to occur during intense rainfall as the town is located at the bottom of a series of valleys. The town is surrounded by gentle slopes which are unlikely to initiate landslides.
Atbulak, Kazygurt District	A linear settlement with a small stream running to the west and a linear ridge to the east, with some houses built on the gentle slopes of the ridge. Earthquakes are a concern due to the relatively close proximity to the mountain front and a steep linear escarpment just 5 km from the village, which could indicate a nearby fault. Floods are unlikely due to the very small headwaters in the mountains and the small flood plain running through the village.
Tonkeris, Tolebi District	A linear settlement rarely more than two houses wide that extends along two small rivers. Parts of the settlement are separated by a series of river crossings. Surrounding slopes are characteristically gentle, with houses largely constructed away from steeper slopes. The exception to this is a small group of houses at the southern and upstream limit of the settlement where the houses have been built next to a moderately steep slope. Earthquakes are possible as the village is located in close proximity to the mountain front. Landslides are not a major concern except perhaps for the southernmost part of the village. Pluvial flooding is possible given the evidence of rilling and freshly washed material on the slopes, particularly in the south of the village.
Burguluk, Tolebi District	A small isolated village, close to a nature reserve, with access via a single road that passes through a relatively steep valley. The village is separated into three parts: two are located on gentle slopes away from the main river and the third on the river flood plain. The hills surrounding the village are generally gently sloping and of low relief. Although there are some steeper slopes, particularly to the south of the river, there are only a handful of houses at the foot of these slopes. There is considerable evidence of rock fall and sediment transport by water in the mountainous part of the catchment but this area does not overlap with the footprint of the settlement. The village is located at the mountain front suggesting that earthquakes are likely. Landslides are not a major concern except that landslides near the road might prevent access to and from the settlement.
Mashat, Tulkibas District	The village is located close to the main highway connecting two major cities. The village is located on a narrow flood plain in a deeply incised valley. The valley sides are steep with extensive rock outcrops and evidence of past rock falls on the valley floor. The valley becomes narrower upstream and further away from the village centre, where there is further evidence of rock falls. While there are few houses located there, there is a holiday camp for children. The gentle valley floor and steep valley sides in some places make landslide dams and outburst floods a possibility. The village is a short distance from a sharp, linear change in topography which suggests a recently active fault and exposure to earthquake shaking. Flooding is also a possibility as the river is not deeply incised and could overwhelm the channel capacity.

Kelte Mashat, Tulkibas District	Some moderately steep slopes around the village with evidence of active, slow moving landslides in the surrounding hills. There is a small river running below the village and a long sinuous irrigation channel from the nearby reservoir which serves the villages downstream. The settlement is close to the a nearby mountain range which suggests a recently active fault and susceptibility to high intensity shaking. River flooding is unlikely.

Table 2: Background information about the survey respondents

Variable	Categories	Frequency	Percentage
Settlement	Atbulak	50	16.6
	Baldiberek & Tonkeris	51	16.9
	Burguluk	50	16.6
	Kelte Mashat	50	16.6
	Mashat	51	16.9
	Turbat	50	16.6
Age	16-24	18	6.0
	25-34	41	13.6
	35-44	77	25.5
	45-54	71	23.5
	55-64	55	18.2
	65-74	21	7.0
	75-84	14	4.6
	85+	4	1.3
	No response	1	0.3
Gender	Male	177	58.6
	Female	124	41.1
	No response	1	0.3
Ethnicity	Kazakh	210	69.5
	Uzbek	54	17.9
	Russian	10	3.3
	Other	23	7.6
	No response	5	1.7
Education	Basic literacy	1	0.3
	Primary school completed	12	4.0
	Secondary school completed	130	43.0
	College completed	84	27.8
	BA/BSc completed	58	19.2
	MA/MSc completed	14	4.6
	Other	1	0.3
	No response	2	0.7
Primary source of cash income	None	41	13.6
	Formal employment	132	43.7
	Own business	58	19.2
	Casual labour	32	10.6
	Other	36	11.9
	No response	3	1.0
Economic status	Well-off	4	1.3
	Comfortably off	223	73.8
	Not so well-off	59	19.5
	Needy	6	2.0
	Don't know	2	.7
	No response	8	2.6

Table 3: The main difficulties faced in the case study communities as identified by the respondents

		Ranking *(where*		
	Difficulties faced	**1**	**2**	**3**
Infrastructure	Poor road network	5	6	
	Poor quality roads	5	5	
	Roads blocked by snow in winter and washed away by melting water	4	2	
	Problems with a bridge		1	
	Lack of shuttle [public] transport	1		
	Lack of sleeping policemen			
Utilities	No gas	33	19	
	Shortage of gas	11	9	
	Problems with gas	7		
	No electricity	1		
	Shortage of electricity			
	Problems with electricity	2	1	
	Loss of power during strong winds	1		
	Electricity and gas are expensive	3		
	Electricity is weak	1		
	Old electricity pillars		1	
	High voltage wires	1		
	No qualified electricians		1	
	No drinking water		2	
	Problems with drinking water (including shortage and low quality)	6	11	
	No irrigation water		2	
	Problems with irrigation water	1	3	
	No drinking and irrigation water		2	
	Shortage of water	2		
	Problem with water supply	3	1	
	Groundwater is located too close to the Earth's surface		1	
	Problems with telephone network		1	
	No houses with all conveniences	1		
Land	No pasture land		1	
	Problem with land		1	
Facilities	No pharmacy		1	
	School is far away		1	
	No state kindergarten	9	2	
	No jobs/unemployment	36	6	
	Lack of social order e.g., noise, lack of cleanliness			
Environmental hazards	Mudflows	1	3	
	Cleaning channels after mudflows		1	
	No outflows from the hills			
	Avalanches in winter	3		
	Snowstorms	3		
	Snow/severe winter	2	1	

	Downpours	1	
	Earthquake	2	
	Lack of lightning rods in the mountains	2	
	Roofs blow away in strong winds		
	Don’t know	1	1
	No difficulties faced	155	214
	Total	303	300