FACTORS AFFECTING THE PROCESS OF TAKING ACTION AT INDIVIDUAL LEVEL REGARDING MITIGATION AND PREPAREDNESS FOR AN EARTHQUAKE IN ISTANBUL

INAUGURALDISSERTATION

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Prof. Dr. Eberhard Parlow

Dekan der Philosophisch-Naturwissenschaftlichen Fakültät

To my son Selçuk and my husband Atilla

and

to Istanbul

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Abbreviations

AYM	Afet Yönetim Merkezi (Disaster Management Centre)
BU	Boğaziçi Üniversitesi (Bosphorous University)
CI	Confidence Interval
DAD	Deprem Araştırma Dairesi (Earthquake Research Department)
DASK	Doğal Afet Sigorta Kurumu (Turkish Catastrophe Insurance Pool)
DIE	Devlet Istatistik Enstitusu (State Statistical Institute)
FGD	Focus Group Discussion
IBB	Istanbul Büyük Şehir Belediyesi (Istanbul Metropolitan Municipality)
IDNDR	International Decade for Natural Disasters Reduction
ISDR	International Strategy for Disaster Reduction
İTÜ	İstanbul Teknik Üniversitesi (Istanbul Technical University)
NAF	Northern Anatolian Fault
OR	Odds Ratio
PANA	Pan American News Agency
PIAR	Piar gallup araştırma AŞ (Piar gallup Custom Market Research Company)
PUB	Proje Uygulama Birimi (Project implementation unit)
SEL	Socioeconomic Level
TAM	Trafik Araştırma Merkezi (Traffic Research Centre)
TBMM	Türkiye Büyük Millet Meclisi (Turkish Grand Assembly)
TC	Türkiye Cumhuriyeti (Turkish Republic)
TOKI	Toplu Konut İdaresi Başkanlığı (Housing Development Administration of Turkey)

TUIK	Türkiye İstatistik Kurumu (Turkish Statistical Institute)
UN	United Nations
WHO	World Health Organization
WMO	World Meteorological Organization

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Summary

In order for disaster management to be effective and successful, efforts to improve preparedness at governmental, sectoral and institutional levels should be supported by corresponding efforts at community and individual levels. However, getting the cooperation of individuals and communities is a complex issue with many inherent difficulties.

The megacity Istanbul is located in an earthquake risk zone and is expected to experience an earthquake in the near future, but on the individual level there appears to be limited interest in preparing for such an earthquake. This study aims to investigate the process of taking action to prepare for an earthquake and mitigate its effects at individual level, to identify the factors influencing this process and to asses the level of preparedness in Istanbul.

The study was conducted in two districts of Istanbul with different levels of earthquake risk. Within these districts three socioeconomic levels (SEL) were considered.

The study is in two parts. In the first part, 12 focus group discussions (FGDs) with citizens living in Bakırköy (higher risk) and Beykoz (lower risk) and 11 in-depth interviews with experts, authorities and key informants were conducted. In the second part, a field survey was carried out in the same districts. A questionnaire was prepared according to the results of the first part of the study and was administered face-to-face by trained interviewers. A total of 1123 people were interviewed.

The qualitative part of the study demonstrated that, within our conceptual framework, which describes the process of taking action to prepare for an earthquake and mitigate its

effects, the behaviour of the group participants fell into three different patterns. The first and most common pattern was interruption of the impetus towards taking action after or during the "awareness" stage by intervening social, personal and environmental factors. Less commonly, the first or subsequent step or steps were taken, but again the process was interrupted before successful completion. Completion of the process was the least common pattern among the group participants.

The qualitative part of the study identified the obstacle to taking action to mitigate damage from earthquakes and to be prepared for them as: low socioeconomic level; absence of belief in the efficacy of measures, for example regarding nonstructural or microscale-measures; helplessness; a culture of negligence; lack of trust in the building sector; environmental factors such as poor predictability and suddenness of onset; and normalisation bias. Factors motivating individuals to take action were: living in higher-risk areas; a higher educational level; direct experience of earthquakes through participating in rescue and solidarity activities during past events; and social interaction.

In our survey sample, 54% of the respondents had taken at least 3 of the 11 measures we asked about and 12% had not taken any measures. The five leading measures generally taken by the respondents were: getting the building tested for construction quality (51%), keeping a torch near the bed (49%), fixing high furniture to walls (39%), obtaining earthquake insurance (38%) and having a family disaster plan (32%). Testing the building for construction quality and obtaining earthquake insurance were significantly more frequent in the high-risk area (X^2: 296.6, $p<0.001$; X^2: 89.34, $p<0.001$).

Logistic regression analysis indicated that education level of the respondents (odds ratio, OR: 2.8, confidence interval, CI: 1.8, 4.4) was the leading factor associated with taking at

least three measures, followed by living in a higher-risk area (OR: 2.3, CI: 1.6, 3.1), participating in rescue and solidarity activities in past earthquakes (OR: 2.0, CI: 1.2, 2.1), a higher earthquake knowledge score (OR: 1.9, CI: 1.4, 2.6), owning the home (OR: 1.8, CI: 1.3, 2.4), living in a neighbourhood known to be inhabited by people with higher SELs (OR: 1.6, CI: 1.1, 2.3), a higher action-stimulating attitudes score (OR: 1.5, CI: 1.2, 2.1) and general safety score (OR: 1.5, CI: 1.1, 2.2) and being in the young age group (16-34 years olds, OR: 0.6, CI: 0.4, 0.99).

It is not easy to change the situation of individuals regarding the factors that are significantly associated with taking action. They need interventions in the political, social and economic systems. But knowledge about earthquakes is the one factor that could be improved through simpler interventions such as effective awareness programmes. Thus every effort should be made effectively to provide earthquake information to the public. Awareness programmes should focus on informing people about how to cope with earthquakes and how to personalise the risk rather than on information about the risk itself and its consequences. In addition, these programmes should involve activities targeted on changing people's attitudes towards different types of measure, actors in disaster management and their own capacity, and to creating a culture of safety in the public.

The target populations in the awareness programmes should be people with a lower educational level living in all areas, tenants, people living in low socioeconomic districts and young people. People who have participated in rescue and solidarity activities could be given appropriate roles and responsibilities to reach the community and local people.

Zusammenfassung

Ein wirksames und erfolgreiches Katastrophenmanagement sollte zusätzlich zu den Anstrengungen zur Verbesserung der Bereitschaft auf Staats-, Branchen- und institutioneller Ebene auch durch entsprechende individuelle und gesellschaftliche Bemühungen unterstützt werden. Eine Zusammenarbeit von Individuen und der Gesellschaft zu erreichen ist jedoch eine komplexe Angelegenheit, welche mit vielen inhärenten Schwierigkeiten einher geht.

Die Megastadt Istanbul befindet sich in einer Erdbebenrisikozone und es wird erwartet, dass sie in naher Zukunft von einem Erdstoss getroffen werden wird. Auf individueller Ebene jedoch scheint nur ein eingeschränktes Interesse an entsprechenden Vorsichtsmassnahmen zu bestehen. Das Ziel der vorliegenden Dissertation ist es, den Maßnahmenprozess betreffend der Vorbereitung auf ein Erdbeben und der Minderung dessen Folgen auf der individuellen Ebene zu untersuchen, die Faktoren zu eruieren, welche diesen Prozess beeinflussen, und den Stand der Bereitschaft in Istanbul zu bestimmen.

Die Studie wurde in zwei einem unterschiedlichen Erdbebenrisiko ausgesetzten Bezirken Istanbuls durchgeführt. Innerhalb dieser Bezirke wurden drei sozioökonomische Niveaus (socio-economic level; SEL) betrachtet.

Die Studie umfasst zwei Teile: Als Erstes wurden 12 Fokusgruppen-Diskussionen (focus group discussions; FGDs) mit Einwohnern von Bakırköy (höheres Risiko) und Beykoz (niedrigeres Risiko) und 11 detaillierte Interviews mit Experten, Behördenvertretern und anderen wichtigen Auskunftspersonen durchgeführt. Nächstens wurde eine Erhebung in

denselben Bezirken durchgeführt. Ein Fragebogen wurde entsprechend den im ersten Teil der Studie gewonnenen Erkenntnissen vorbereitet, und die Interviews durch ausgebildete Befrager persönlich durchgeführt. Insgesamt wurden 1123 Personen befragt.

Der qualitative Teil der Studie ergab, dass sich das Verhalten der Befragten in dem von uns entwickelten Bezugssystem, welches den Prozess der Vorbereitung auf ein Erdbeben und der Massnahmen zur Schadenminimierung beschreibt, in drei verschiedene Kategorien unterteilen lässt. Das häufigste Verhaltensmuster war ein während oder nach der Bewusstseinsbildung erfolgter Abbruch des Impulses, Vorbereitungen zu treffen, ausgelöst durch den Einfluss von sozialen, persönlichen und Umgebungsfaktoren. Weniger häufig wurden ein oder mehrere Schritte unternommen, doch dann wurde der Prozess wiederum unterbrochen bevor er zu einem erfolgreichen Abschluss gebracht wurde. Die Beendigung des Vorbereitungsprozesses war das seltenste Verhaltensmuster unter den Teilnehmern.

Der quantitative Teil der Studie identifizierte die folgenden Faktoren als Hindernisse zum Ergreifen von Maßnahmen zur Minimierung von Erdbebenschäden und zur Vorbereitung auf ein solches Ereignis: niedriges sozioökonomisches Niveau, Skepsis gegenüber der Wirksamkeit von Maßnahmen, z.B. bezüglich nicht-struktureller oder sehr beschränkter Massnahmen, Hilflosigkeit, eine Kultur der Nachlässigkeit, fehlendes Vertrauen in den Bausektor, Faktoren wie die sehr beschränkte Vorhersagbarkeit und das plötzliche Auftreten des Ereignisses, und die Normalisierungsverzerrung (Normalisation Bias). Motivierende Faktoren für das Ergreifen von Massnahmen waren: Wohnen in einem Hochrisikogebiet, ein besserer Ausbildungsstand, direkte Erfahrung mit Erdbeben mittels

einer Teilnahme an Rettungs- und Solidaritätsaktionen nach vorangegangenen Erdbeben, und soziale Interaktionen.

In unserer Stichprobe hatten 54% der Antwortenden mindestens 3 der 11 Maßnahmen getroffen, welche wir ansprachen, und 12% hatten überhaupt nichts unternommen. Die 5 von den Befragten am häufigsten unternommenen Massnahmen waren: Veranlassen eines Gutachtens betreffend der Bauqualität des Gebäudes (51%), Bereithalten einer Taschenlampe nahe dem Bett (49%), Befestigen großer Möbel an der Wand (39%), Abschliessen einer Erdbebenversicherung (38%) und das Erstellen eines Familiennotfallplans (32%). Das Überprüfen der Bauqualität des Gebäudes und das Abschliessen einer Erdbebenversicherung wurden im Hochrisikogebiet signifikant häufiger erwähnt (X^2: 296.6, p<0.001; X^2: 89.34, p<0.001).

Eine logistische Regressionsanalyse ergab, dass das Ausbildungsniveau der Antwortenden der wichtigste erklärende Faktor war für das Ergreifen von mindestens drei Maßnahmen (odds ratio; OR: 2.8, Konfidenzintervall; KI: 1.8, 4.4), gefolgt vom Wohnen in einem Gebiet mit erhöhtem Risiko (OR: 2.3, KI: 1.6, 3.1), der Teilnahme an Rettungs- und Solidaritätsaktionen nach früheren Erdbeben (OR: 2.0, KI: 1.2, 2.1), einem höheren Wissensstand über Erdbeben (OR: 1.9, KI: 1.4, 2.6), Hausbesitz (OR: 1.8, KI: 1.3, 2.4), dem Wohnen in einem Geviert mit bekanntermassen ökonomisch besser gestellten Einwohnern (OR: 1.6, KI: 1.1, 2.3), dem besseren Abschneiden bezüglich einem Mass an aktivitätsfördernder Einstellung (OR: 1.5, KI: 1.2, 2.1) und dem allgemeinen Sicherheitsverhalten (OR: 1.5, KI: 1.1, 2.2), und der Zugehörigkeit zu der jungen Altersklasse (16 - 34 Jahre; OR: 0.6, KI: 0.4, 0.99).

Es ist nicht einfach, die individuelle Lage bezüglich der signifikant mit dem Ergreifen von Massnahmen assoziierten Faktoren zu verändern. Hierzu sind Aktivitäten auf der politischen, sozialen und ökonomischen Ebene erforderlich. Das Wissen bezüglich Erdbeben ist jedoch ein Faktor, welcher durch relativ einfache Interventionen wie z.B. effektive Erziehungsprogramme verbessert werden kann. Daher sollte jede mögliche Anstrengung unternommen werden um das Wissen der Bevölkerung über Erdbeben zu verbessern. Programme zur Förderung des Bewusstseins sollten erstens darauf abzielen, dass Individuen das Risiko als ein persönliches wahrnehmen, und zweitens die Bevölkerung darüber informieren, wie sie bei einem Erdbeben reagieren soll. Diese Informationen sind nützlicher als solche über über die Gefahr selbst und deren Folgen. Zusätzlich sollten diese Programme Aktivitäten umfassen, welche auf eine Änderung der Einstellung gegenüber verschiedenen Massnahmen, Akteuren des Katastrophenmanagements und ihrer eigenen Fähigkeiten abzielen sowie auf den Aufbau einer öffentlichen Sicherheitskultur.

Das Zielpublikum dieser Programme zur Bewusstseinsförderung sollten Bewohner der Gebieten mit erhöhtem und niedrigem Risiko, Personen mit einem niedrigen Bildungsniveau, Mieter, Bewohner von Vierteln mit tiefem sozio-ökonomischem Niveau sowie Junge sein. Teilnehmer an früheren Rettungs- und Solidaritätsaktivitäten könnten angemessene Rollen und Verantwortungen übernehmen um die Öffentlichkeit und die lokalen Bewohner zu erreichen.

Özet

Etkili ve başarılı bir afet yönetimi gerçekleştirmek için, devlet/hükümet düzeyindeki, sektörel ve kurumsal düzeydeki hazırlıkları iyileştirilmesi çabası toplumsal ve bireysel düzeyde benzer bir çaba ile desteklenmelidir. Ancak, bireylerin ve toplumun desteğini almak birçok kronik zorluğu olan karmaşık bir konudur.

Megakent Istanbul bir deprem bölgesinde yer almaktadır ve yakın bir gelecekte deprem yaşaması beklenmektedir, fakat bireyler arasında beklenen depreme hazırlanma konusunda sınırlı bir ilgi vardır. Bu noktadan yola çıkarak çalışmamız bireysel düzeyde, deprem hazırlığına ve deprem zararlarını önlemeye yönelik eylemde bulunma sürecini araştırmayı, bu süreci etkileyen faktörleri belirlemeyi ve İstanbuldaki bireysel hazırlık düzeyini tesbit etmeyi hedeflemektedir.

Çalışma İstanbul'un farklı deprem risklerine sahip iki ilçesinde ve bu ilçeler içerisinde de farklı sosyoekonomik düzeyler (socioeconomic level, SEL) gözönüne alınarak gerçekleştirilmiştir. Çalışma iki bölümden oluşmaktadır.

İlk bölümde, Bakırköy ve Beykozda oturan kişiler ile 12 odak grup görüşmesi yapılmış, ayrıca uzman, yetkili ve anahtar kişiler ile olmak üzere 11 derinlemesine mülakat gerçekleştirilmiştir.

İkinci bölümde aynı ilçelerde olmak üzere bir anket çalışması yürütülmüştür. Çalışmanın ilk kısmının sonuçları gözönüne alınarak hazırlanan anket formu deneyimli anketörler tarafından yüz yüze uygulanmıştır.

Çalışmanın kalitatif kısmı göstermiştir ki; odak grup katılımcıları deprem riskini azaltma ve hazırlıklı olmaya yönelik önlem alma sürecini tanımlamak için hazırladığımız kuramsal çerceve içinde üç farklı davranış şekli göstermektedirler. İlk ve en sık görülen davranış şekli, kuramsal çercevede yer alan '*farkındalık*' evresi içerisinde ya da bu evre tamamlandıktan sonra sürecin sosyal, bireysel yada çevresel faktörlerin etkisi ile kesintiye uğramasıdır. Daha az sıklıkta görülen ikinci davranış şeklinde süreç bir sonraki ya da onu takip eden diğer evreler ile devam etmekte ama yine süreç başarı ile tamamlanamadan kesintiye uğramaktadır. Sürecin başarı ile tamamlanması grup katılımcıları arasında en az sıklıkta görülen davranış şekli olmuştur.

Çalışmanın kalitatif kısmı, düşük sosyoekonomik durumu; önlemlerin etkisine yönelik inanç eksikliğini -örneğin yapısal olmayan ve mikro düzedeki önlemlere yönelik kuşku-; çaresizliği; umursamazlık kültürünü; yapı sektörünün tüm aktörlerine güvensizliği; çevresel faktörleri -örneğin önceden tahmin edilebilirliğinin henüz zayıf oluşu, olayın ani gerçekleşmesi, iki olay arasında hayatın normalleşmesi (Normalisation Bias) gibi-, depremlere yönelik risklerin azaltılması ve hazırlıklı olunması için önlem alma sürecindeki engeller olarak ortaya koymuştur. Yüksek riskli bir bölgede oturmak; lise ve üniversite mezunu olmak; daha önceki depremlerde kurtarma ve yardımlaşma çalışmalarına katılarak deprem deneyimi sahibi olmak; sosyal etkileşim ise bu süreçteki motive edici faktörlerdir.

Anket çalışmasının örnekleminin %54'ü sorduğumuz onbir önlemden en az üçünü almışlardır, %12'si herhangibir önlem almamıştır. Binanın yapı güvenliği açısından kontol ettirilmesi (%51), yatağın yanında el lambası bulundurulması (%49), yüksek eşyaların sabitlenmsi (%39), deprem sigortası yaptırmak (%38), aile afet planı hazırlamak

(%32) tüm örneklem içinde en sıklıkla alınan beş önlemdir. Fakat, binanın yapı güvenliği açısından kontol ettirilmesi ve deprem sigortası yaptırmanın sıklığı riskli bölgede anlamlı olarak daha fazladır (X^2: 296.6, p<0.001; X^2: 89.34, p<0.001).

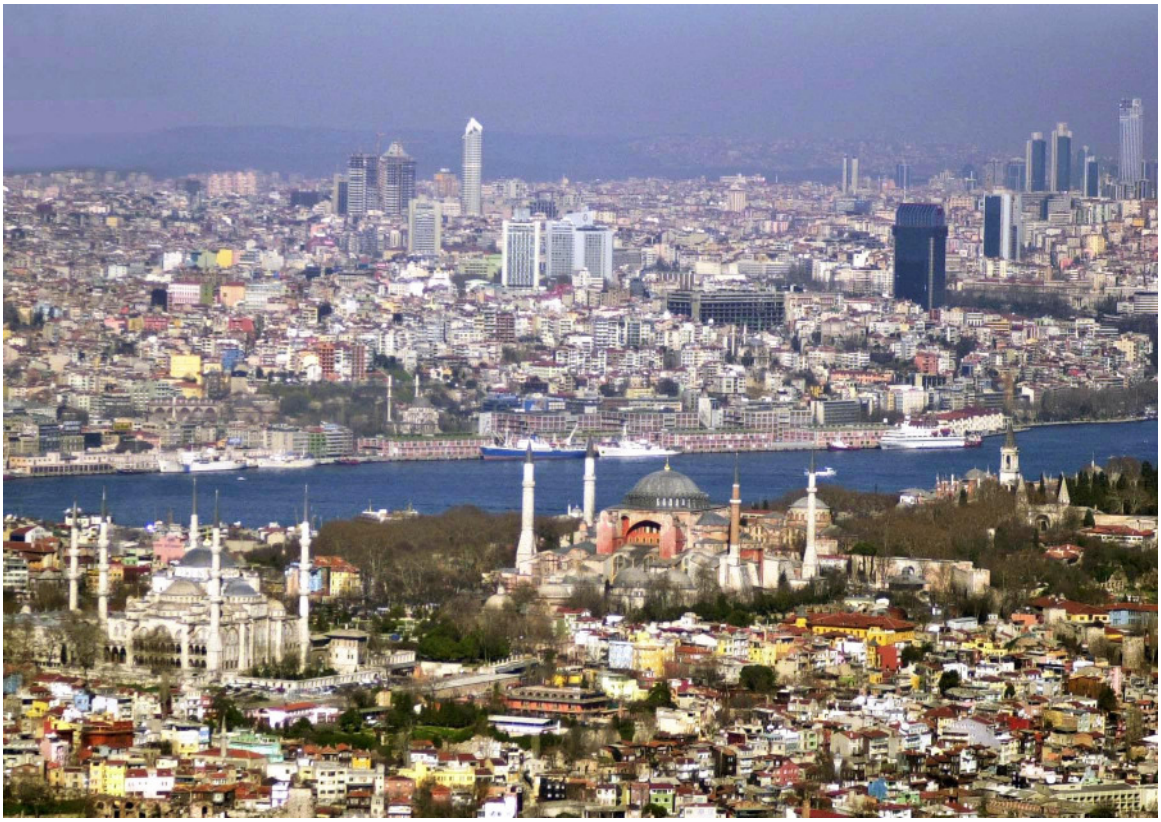
Lojistik regresyon analizi eğitim seviyesinin (olasılıklar oranı, odds ratio, OR: 2.8, güven aralığı, confidence interval, CI: 1.8, 4.4) en az üç önlem almış olmayı etkileyen en önemli faktör olduğunu göstermiştir. Bunu sırası ile yüksek riskli bir bölgede oturmak (OR: 2.3, CI: 1.6, 3.1), geçmiş depremlerde kurtarma ve yardımlaşma çalışmalarına katılmış olmak (OR: 2.0, CI: 1.2, 2.1), yüksek deprem bilgisi skoru (OR: 1.9, CI: 1.4, 2.6), ev sahibi olmak (OR: 1.8, CI: 1.3, 2.4), yüksek sosyoekonomik düzeydeki bir mahallede oturmak (OR: 1.6, CI: 1.1, 2.3), yüksek eylemi-motive-edici tutum skoru (OR: 1.5, CI: 1.2, 2.1), yüksek genel güvenlik skoru (OR: 1.5, CI: 1.1, 2.2) ve genç yaş grubunda olmak (16-34 yaş, OR: 0.6, CI: 0.4, 0.99) izlemektedir.

Önlem alma ile ilgili anlamlı ilişkisi tesbit edilen faktörlere yönelik bireylerin durumlarını değiştirmek oldukça zordur. Bu yönde bir değişim politik, sosyal ve ekonomik sistemelere bir dizi müdehaleyi gerektirir. Fakat bu faktörler arasında sadece deprem bilgisi etkin farkındalık programları gibi daha basit müdehalerle geliştirilebilir. Bu yüzden çabalar bireylere etkili bir biçimde deprem bilgisi vermeye yoğunlaşmalıdır. Söz konusu programlar riskin kendisine ve sonuçlarına yoğunlaşmak yerine depremler ile nasıl başedileceğine dair ve bireylerin varolan riski kişiselleştirmesine yardımcı olacak bilgilerin yaygınlaştırılmasına yoğunlaşmalıdır. Ayrıca bu tür programlar bireylerin farklı önlemlere, afet yönetiminin aktörlerine, kendi kapasitelerinin önemine yönelik tavırlarını değiştirmeyi ve toplumda güvenli yaşam kültürünü oluşturmayı hedefleyen etkinlikleri kapsamalıdır. Düşük eğitim seviyesindeki kişiler, yüksek riskli bölgelerde olduğu kadar

daha az riskli bölgelerde yaşayanlar, kiracılar, düşük sosyo ekonomik düzeydeki yerleşim yerlerinde oturanlar ve gençler bu programların hedef kitlesini oluşturmaktadır. Daha önceki depremlerde yardımlaşma ve dayanışma çalışmalarına katılmış olan bireyler uygun görev ve sorumluluklar verilerek bu programların topluma ve yerel düzeye ulaşmasına yardımcı olabilirler.

PART I

BACKGROUND



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1. Introduction

1.1 Background to the problem and the public health relevance

Natural disasters have always affected human health and wellbeing. Despite developments in knowledge and technology, their impact has increased in severity in recent decades. The contribution of human-made and natural disasters to the global burden of disease is expected to climb from twelfth place in 1998 to eighth place in 2020 (Global Forum Health Research, 2001). The World Meteorological Organization has estimated that the impact of natural disasters on the world economy is 50 billion dollars annually (PANA, 1999).

Natural disasters affect communities in various economic and social ways. As well as the effects on public services such as water, sewerage and energy, the massive adverse impact of natural disasters on the health of populations has also caused them to be acknowledged as public health problems (Noji, 1997).

Public health plays an important role in disaster issues, and not only because of the impact of disasters on health. The public health perspective can also contribute to preparedness and prevention efforts, as seen in the debate on primary health care and prevention versus cure (Loretti, 2000). The United Nations underlined this principle for disaster reduction strategies during the last decade with initiatives such as the International Decade for Natural Disasters Reduction and the International Strategy for Disaster Reduction (ISDR), which were intended to move the debate towards activities in anticipation of a disaster that also aim to enhance the impact of response and post-disaster activities through preparedness programmes. Both nationally and internationally,

however, large amounts of money and resources are being allocated for direct response activities to disasters.

1.2 The problem and the overall aim of the study

Unfortunately, not only governments, organizations or institutions but also people at risk are not very keen about pre-disaster activities, which involve prevention, mitigation of damage and preparedness. In order to cope effectively with disasters the inherent difficulties in getting people to take preparatory action need to be overcome. This situation highlights the need to understand and describe the process of taking precautions and the factors determining it. The aim of this study is, therefore, to investigate the process of taking action regarding preparedness for an earthquake and mitigation of its effects at individual level and to identify the factors that influence it.

1.3 Specific objectives

The specific objectives of the study are to;

i. investigate the process of taking action regarding preparedness for an earthquake and mitigation of its effects at individual level;

ii. assess the level of preparedness in the study area for the predicted earthquake;

iii. test whether there is a difference regarding the taking of such action at individual level between residents of higher- and lower-risk districts and between groups with different socioeconomic levels;

iv. identify additional personal, social and environmental factors that are associated with taking action to prepare for and mitigate the effects of the predicted earthquake.

1.4 Overview of chapters

Chapter 1 gives general information about the background of the problem and defines the problem, the aim of the study and the specific objectives. Chapter 2 consists of a paper about the conceptual framework and the current situation in Istanbul regarding activities to prepare for an earthquake and mitigate its effects at individual level.

In order to avoid duplication, Chapter 3 only mentions the study area and the methodology very briefly. More information about these issues can be found in the relevant parts of Chapters 4 and 6.

The results of the study are discussed in two parts. The findings of the qualitative data are presented in an article and working paper in Part III (Chapters 4 and 5) and the results of the quantitative data are presented in another article in Part IV (Chapter 6).

Chapter 7 is a general discussion of the study, including conclusions and recommendations.

2. Conceptual framework and current situation regarding earthquake preparedness in Istanbul

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2.1 Introduction

This chapter addresses the importance of involving and ensuring the active participation of individuals and communities in disaster mitigation and preparedness activities. The definition of such activities has been given as: "*Preparedness comprises activities designed to minimize loss of life and damage, to organize the temporary removal of people and property from a threatened location, facilitate timely and effective rescue, relief, and rehabilitation, while mitigation comprises measures taken in advance of a disaster aimed to decreasing or eliminating its impact on society and environment.*" (Wisner & Adams, 2002: 13). The key question raised in this paper is: what are the factors affecting action regarding preparedness for an earthquake and mitigation of earthquake damage at the individual level in Istanbul?

After brief information about the process of taking action regarding preparedness for and mitigation of a disaster, the megacity of Istanbul will be reviewed as an example, looking at the factors affecting the way the residents undertake such activities. In conclusion, some recommendations will be put forward.

The impact of natural hazards has increased in severity in recent decades due to the growing vulnerability[1] of populations through, *inter alia*, rapid population growth, urbanization, environmental degradation, poverty and social inequalities (Arnold, 2002; Brauch, 2005; Wisner & Adams, 2002). It is, therefore, becoming vital that pre-disaster activities should be undertaken at both community and individual levels to mitigate the

[1] The term "vulnerability" explains "*the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard*" (Wisner et al., 2004: 11) and "*a function of susceptibility (the factors that allow a hazard to cause a disaster) and resilience (the ability to withstand the damage caused by emergencies and disasters and then to recover)*" (Wisner & Adams, 2002: 13).

consequences of disasters and sustain the population's resilience. To be effective and successful, efforts to improve mitigation and preparedness activities at governmental, sectoral and institutional levels should be supported by corresponding efforts at the community and individual levels. For example, land-use strategies or the application of building codes do not mean much if they are not observed (as often happens), and early warning systems are useless if the people do not know what to do or are unprepared for such situations.

The opposite is also true: governments should support individual and community disaster preparation efforts. For example, first aid training could be provided for volunteers and cheap credits given to home-owners to strengthen the construction of their homes. This is why disaster risk reduction was described in the context of the ISDR as a shared responsibility between governments, communities and individuals (ISDR 2004). Additionally, in many disasters the victims and local people are the first to respond, especially where search and rescue activities are concerned. They can also be isolated or unreachable in the early phases of disasters and thus have no option but to cope with the situation by themselves. Their involvement and active participation in any kind of mitigation and preparedness activities are, therefore, essential for coping successfully with natural disasters.

Getting the cooperation of individuals and communities is, however, more easily said than done. Studies in various countries with different economic and social backgrounds have shown that people tend to be uninterested in and unwilling to take action for preparedness and to reduce the risks (Anderson-Berry, 2003; Dedeoğlu, 2005; Fişek, Yeniçeri, Müderrisoğlu, & Özkarar, 2003; Hurnen & McClure, 1997; Inelmen, Işeri-Say,

& Kabasakal, 2004; Kleindorfer & Kunreuther, 1999; Larsson & Enander, 1997; Paton, 2003; Shaw, Shiwaku, Kobayashi, & Kobayashi, 2004). Many social, economic, personal and environmental factors underlie this situation. Freedom from the impact of hazards can only be achieved when people who are vulnerable to such hazards and disasters (which are often intensified by associated societal threats, challenges, vulnerabilities and risks) receive better warning of them and are prepared and protected against their impact (Brauch, 2005). While many studies focus on understanding the susceptibilities of populations, an equal understanding of the characteristics of resilience in a population is also important in maintaining this freedom and mitigating the consequences of hazards.

2.2 Factors affecting individual preparedness

Figure 2.1 presents a conceptual framework we drew up to show the process of taking precautions at individual level. This framework is based on theories and models which have often been used in epidemiological studies to understand risky and protective health behaviour and activities (Health Belief Model (Becker, 1974; Schwarzer, 1991; Strecher & Rosenstock, 1997); Theory of Reasoned Action and Theory of Planned Behaviour (Ajzen and Fishbein, (1991; 1980); and Protection Motivation Theory (Rogers, (1975), which was inspired by DeJoy's model for Workplace Self-protective Behaviour (1996)). These models and theories have been applied to a wide range of preventive and lifestyle behaviour (e.g. vaccination, smoking, use of seatbelts, safe sex practices and exercise) (DeJoy, 1996) and each of them makes some contribution to understanding the type of behaviour which has similarities with behaviour regarding disaster preparedness.

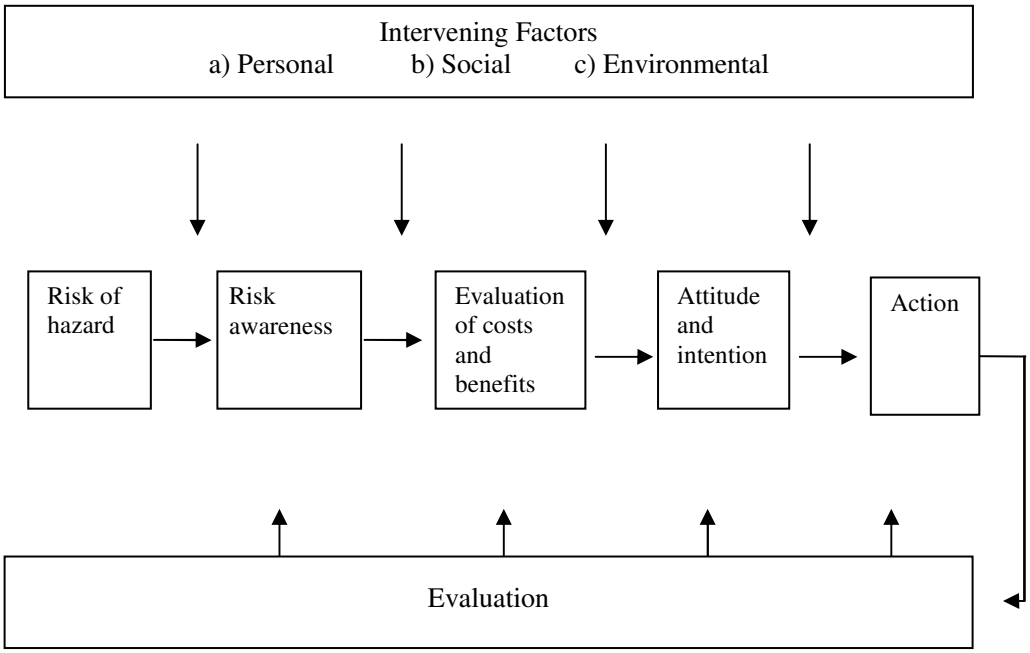

Figure 2.1 Conceptual framework for the process of taking action regarding disaster mitigation and preparedness

In summary, this framework presents a five-stage process and shows that where there is a risk of hazard, awareness of this risk is the pre-requisite of taking action. *Risk of hazard* is the risk of a hazard occurring and involves the type, severity, frequency and impact of it. *Risk awareness* includes perception and knowledge of the risk, its consequences and how to cope with it, which are determined by the availability of reliable and accessible information. These factors have an important influence on the process of taking action to prepare for disasters and mitigate their effects (Dedeoğlu, 2005; Johnston, Bebbington, Lai, Houghton, & Paton, 1999; Kasapoğlu & Ecevit, 2001; Mileti & Fitzpatrick, 1992; Ronan, Johnston, Daly, & Fairley, 2001; Weinstein & Sandman, 1992). Although they present high correlations with taking such action, these factors do not, however,

automatically guarantee better preparedness at the individual level or mitigation of the effects of disasters (Chan, 1995; Johnston et al., 1999; Paton, 2003).

The next stage is the evaluation of the *costs* and *benefits* of the measures. When deciding whether to prepare for hazards, a person weighs the physical, psychological and economic costs of taking action against the probable benefits to life and property in the future, and evaluates whether the input can bring greater and/or similar benefits if invested in another area – much as economists do when considering the opportunity cost of an intervention or an investment. According to the results of this evaluation, the sequence might continue with a person's *attitudes* towards and *intentions* regarding taking action for mitigation and preparedness, followed by the action taken. Sometimes, as a consequence of a disaster or some other development, the action concerned may be followed by evaluation applied to all or some of the stages.

The process of *taking action* cannot be considered only in the context of hazard. A series of social, personal and environmental factors is also crucial in this process. This is why intervening factors have been included in the framework. Each stage and the transition phases can be positively or negatively influenced by intervening personal, social or environmental factors. Elements of these factors are as follows:

a) *personal factors:* previous experience with a disaster (Anderson-Berry, 2003; Johnston et al., 1999; Weinstein, 1989); availability of resources, such as time, skill and financial and physical resources (Chan, 1995; Mamun, 1996); demographic characteristics such as age, cohabitation, the presence of a child in the household, type of residence (e.g. own/rent) (Larsson & Enander, 1997); unrealistic optimism (Burger & Palmer, 1992; Weinstein, 1989); denial (Lehman

& Taylor, 1987); personal beliefs such as outcome expectancy including perceptions of whether individual action will effectively mitigate or reduce a problem (Lindell & Whitney, 2000; Rohrmann, 2000) and perception of hazards as controllable or uncontrollable (Rohrmann, 2000; Slovic, Fischhoff, & Lichtenstein, 2001); fatalism, helplessness (Mamun, 1996); perceived dread of the hazard (Renn, Wiliams, Kasperson, Kasperson, & Slovic, 1992); transfer of responsibility to others (e.g. state, government or local authorities) (Inelmen et al., 2004; Johnston & Benton, 1998; Paton, 2003); and world views (Slovic, 2001);

b) *social factors:* socioeconomic status, social class (Burningham, Fielding, & Thrush, 2008); social network (Anderson-Berry, 2003; Paton, Millar, & Johnston, 2001); sense of community (Paton, 2003); social support and interaction (Mileti & Fitzpatrick, 1992); cultural phenomena (Bontempo, Bottom, & Weber, 1997; Kasapoğlu & Ecevit, 2001); lack of trust (Inelmen et al., 2004); and media coverage (Renn et al., 1992);

c) *environmental factors:* these are mainly related to the phenomenon: frequency of occurrence; normalisation bias (Becker, Smith, Johnston, & Munro, 2001; Paton, 2003); imaginability of and potential for catastrophe (Slovic et al., 2001); characteristics and impact of the hazard agent such as speed of onset, scope and duration of impact (Lindell, 1994); and location (Lindell & Prater, 2000).

2.3 Megacities and vulnerability of their residents in relation to natural disasters

The global urban population was 46.7% of the total world population in 2000 and is estimated to rise to 59.9% in 2030 (UN, 2006, 2007). In the modern world, urban areas are at the highest risk of disasters since those are places where nearly all the factors that make populations more vulnerable are seen or experienced. These factors include high population concentration and densities, in some cases uncontrolled spatial expansion and severe infrastructural deficits, high concentration of industrial production, insufficient housing provision, ecological degradation, in some cases extreme socioeconomic disparities, and high immigration rates (Kraas, 2003/4). Furthermore, the most crowded cities of the world are located in areas that are at extremely high risk of natural disasters (ISDR, 2004). As more people move each year to urban areas, it is clear that special attention should be given to the development of projects covering urban preparedness.

Disasters in urban settlements can also have positive consequences for awareness. Özerdem and Barakat (2000) mentioned the urban–rural dichotomy when pointing out that even though there have been many earthquakes in Turkey[2], it was only after the 1999 earthquake that earthquake safety and disaster management began to be taken seriously due to the large number of urban areas affected and because the victims were mainly urban dwellers.

An investigation into earthquake preparedness in Istanbul would benefit other cities, even for other types of disaster, since megacities have more in common with each other than

[2] From 1902 up to and excluding the two earthquakes in 1999 earthquakes caused 129 events in Turkey that produced damage such as the loss of housing stock. Of these, 92 resulted in fatalities ranging from 1 to 3959 deaths (http://angora.deprem.gov.tr/raporen.htm, 7 February 2008).

with their own hinterlands (Kraas, 2003/4). In addition, although all hazard events are unique and their consequences may differ depending on many factors, the similarities in the human response to hazards means that the results could also have general relevance for other hazards. The suggestion here is not, of course, to carbon copy the application of the methods and findings to all cities and all types of natural hazard, but to bear in mind the common aspects in human response and living circumstances.

2.4 The case of Istanbul

The social, demographic and economic characteristics of Istanbul can be summarized briefly as follows. The 2007 general census showed that 12,573,836 people were living in Istanbul; the population density was 2,420 people per km²; 89% of the people were living in urban areas; and 70% of the population was aged between 15 and 64 years.[3] The annual population growth rate was 3.3% and the unemployment rate was 12.7% (IBB, 2001). The high population growth rate in Istanbul is mostly due to migration of low-income groups from other parts of Turkey looking for work. This situation produces many problems which increase the vulnerability of the population, such as overcrowding, inadequate infrastructure and services, environmental degradation and informal settlements (the *gecekondu,* which are makeshift one-storey houses built illegally on public land on the outskirts of the city). Since *gecekondus* are constructed without regard to building codes and regulations, the structures are weak and susceptible to hazards. Unfortunately one fifth of the Istanbul population lives in the *gecekondu* (Keleş & Geray,

[3] Türkiye İstatistik Kurumu: Turkish Statistical Institute (TUIK) (http://www.turkstat. gov.tr, 7 February 2008).

1995). There are approximately 2,714,462 buildings in Istanbul, of which only 32% are insured against earthquake risk (DASK, 2008), even though such insurance has been compulsory since the end of 1999.

On 17 August and 12 November 1999, the Marmara region, where Istanbul is located, was shaken by two severe earthquakes, with magnitudes of 7.4 and 7.2, respectively, on the Richter scale which cost nearly 18,000 lives and did severe damage to buildings, economic life and infrastructure (T.C. Sayıştay Başkanlığı, 2002/3). Some authors have estimated that there is a 62% probability (± 15%) of an earthquake of a magnitude of approximately 7 on the Richter scale before 2030 in the vicinity of Istanbul (Parsons, Toda, Stein, Barka, & Dieterich, 2000). During the 1999 earthquakes Istanbul, was not affected as badly as other cities in the Marmara region (except the Avcılar district), mainly due to the distance from the epicentres.

The province of Istanbul consists of 1 metropolitan municipality and 32 district municipalities. Of the latter, 13 are located in the first-degree (highest) earthquake risk zone, 17 located in the second-degree earthquake risk zone, 2 are in the third-degree earthquake risk zone, and only 2 sub-districts (non-urban) are in the fourth-degree earthquake risk zone (AYM, 2005).

2.5 Individual preparedness in Istanbul

Fortunately, increasing numbers of studies about human response to hazards and individual and community preparedness are being undertaken as more scientists and institutions in different disciplines have begun to deal with these issues. There is still,

however, a limited number of studies both at national and international levels. The following section offers findings from a few studies conducted in Istanbul regarding individual and community preparedness.

When the features presented in this section are considered in the context of a predicted earthquake, it can be easily understood how severe the consequences would be. As well as other socioeconomic consequences, one scenario for a predicted earthquake expects that there would be 30,000–40,000 casualties and more than 120,000 injured people needing hospitalization (BU, 2003). The 1999 earthquake in Turkey and experience in the rest of the world have shown that most minor and medium injuries are caused by non-structural elements and building contents, such as glass and furniture (Noji, 1997; Petal, 2000). Furthermore, in previous experiences almost all victims were either rescued by local people (neighbours, family members) or saved themselves (Dedeoğlu, Hakan, & Kayıhan, 2000; WHO, 1999). These two findings clearly highlight that individual preparedness plays a critical role and that there are many things that individuals and the community can do to prevent or mitigate the consequences of earthquakes, even with small-scale investments. Although many promising mitigation and preparedness programmes have been conducted since the 1999 earthquakes, the situation in Istanbul regarding earthquake preparedness at individual and community level is not adequate.

The level of awareness about the predicted earthquake among the inhabitants of Istanbul is quite high. In a study by Fişek and colleagues (2003), respondents presented a realistic appraisal of the risk they faced in terms of the security of their zones[4]. In the same study,

[4] Information on high-risk districts considering earthquake zones or the site-dependent intensity distribution of a scenario earthquake is provided by relevant national government and municipal departments and universities and is available to the public. For detailed information about risk zones or high-risk areas, refer

75% of the respondents gave relevant answers to the question of what an earthquake was and 62% saw construction as the real source of danger. Many inhabitants of Istanbul had experienced earthquakes before (Bay, 2006; IBB, 2002) and had a high perception of the risk of a predicted earthquake. Studies conducted in different districts of Istanbul have shown that over 50% of the respondents perceived a high risk of a predicted earthquake, ranging from 68.8% (Kalaça, Aytekin, & Çalı, 2007); 52.5% (Işeri Say, İnelmen, & Kabasakal, 2005); 58.3 % (IBB, 2002) to 58.1%[5] (T.C. Başbakanlık PUB, 2005). However, risk perception declines when the question is referred from the city to the individual level (Işeri Say et al., 2005). In a study by Bay Aytekin (2006), 26% of the respondents thought that nothing could be done on an individual level against earthquakes. Structural safety was the most commonly mentioned measure (67%) as a way to mitigate the damage from an earthquake among the respondents to the study by Fişek and colleagues (2003). Notwithstanding people's high perception of risk, very few preparedness or mitigation activities were being undertaken (Fişek et al., 2003; IBB, 2002; Inelmen et al., 2004; Kalaça et al., 2007): more than 10% of the respondents had not taken any kind of preparedness and/or mitigation measures. According to Kalaça and colleagues (2007) and Işeri Say and colleagues (2005), 12.9 % and 16.7%, respectively, of the respondents had taken no measures regarding earthquake preparedness, even though earthquakes were often a theme of daily conversation (IBB, 2002; T.C. Başbakanlık PUB, 2005).

to Afet Işleri Genel Müdürlüğü Deprem Araştırma Dairesi/General Directorate of Disaster Affairs, Earthquake Research Department (http://www.deprem.gov.tr) or Istanbul Metropolitan Municipality (http://www.ibb.gov.tr/trTR/SubSites/IstanbulVeDeprem/) and B.U., 2003: Earthquake Risk Assessment for the Istanbul Metropolitan Area Final Report.

[5] Risk perception for a destructive earthquake in Istanbul in two to five years or later was 58.1%, and within the coming three months or in a year was 13.5%.

The most common mitigation and preparedness activities undertaken were: learning how to behave during an earthquake; having an earthquake bag/kit; fixing high furniture and equipment; and obtaining earthquake insurance (Fişek et al., 2003; IBB, 2002; Kalaça et al., 2007).

2.6 Factors affecting individuals in taking mitigation and preparedness action in Istanbul

The 1999 Marmara earthquakes, which killed over 18,000 people, showed the importance of action to prepare for an earthquake in the city of Istanbul. The need to mitigate damage and for preparedness activities was only acknowledged after these deadly earthquakes (Balamir, 2001; Karancı & Akşit, 2000; Tekeli-Yeşil, Tanner, Braun-Fahrlaender, & Dedeoğlu, 2007). The findings of various studies showed that the following are important factors in undertaking mitigation and preparedness activities.

1) *Socioeconomic level*: two studies (Fişek et al., 2003; Kalaça et al., 2007) showed that respondents with a high income or living in high socioeconomic level districts had a significantly higher score of completed precautions or had taken more precautions than other groups.

2) *Educational level*: the study of Bay Aytekin (2006) showed that a higher educational level had a significant influence on action-stimulating attitudes towards preparedness, as well as on taking more precautions.

3) *Area of residence:* one study (Kalaça et al., 2007) showed that the citizens of Istanbul gave a realistic appraisal of the risk they faced in terms of the security of their zones,

corresponding to the finding that respondents living in higher-risk areas had taken more precautions.

4) *High perception of risk*, especially when the risk is perceived as a threat to the person or the family (Kalaça et al., 2007). However, a high perception of risk was not followed by action among the respondents to another study (Fişek et al., 2003).

5) *Trust:* two studies (Öncüler, 2002; T.C. Başbakanlık PUB, 2005) of individuals' decision-making regarding retrofitting buildings against earthquakes showed that trust (in the institutions that plan, apply and control retrofitting projects) was an important determinant for decision-making in favour of mitigation of damage. Another study (Green, 2008) discussed the distrust of the construction process, especially among residents of *gecekondu* districts. She argued that additional to the root causes of unauthorised housing (poverty, macro-economic instability, urban migration and hierarchical social relationships), this distrust promotes unauthorised, self-built construction because these people perceived self-built houses as more, rather than less earthquake-resistant, as they are built by themselves and not by someone interested in profit. Inelmen and colleagues (2004) discussed the lack of trust in various information sources; as well as other studies (IBB, 2002), their study showed that scientists and university institutions were the most trusted sources to provide information about earthquakes.

6) *Experience of an earthquake*: Kalaça et al (Kalaça et al., 2007) found that experience of a high-magnitude earthquake, losing someone in the close circle and participating in solidarity activities during the 1999 earthquakes were significant factors.

7) *Fatalism*: even though almost all the studies mentioned wrote about the existence of fatalism, most of them did not find it to be a significant factor in taking precautions. However, Inelmen and his colleagues (Inelmen et al., 2004) found it to be a significant factor for not joining disaster-preparedness organisations.

Additionally, group dynamics in blocks of flats (T.C. Başbakanlık PUB, 2005) and home ownership (Fişek et al., 2003; Kalaça et al., 2007) were mentioned as important factors in taking decisions in favour of mitigation and preparedness measures. Öncüler's (2002) research showed that average willingness to pay for earthquake mitigation measures increased when a building nearby had been fitted, and that the amount of reduction in damage due to taking mitigation measures was another factor in decision-making. Respondents were more likely to pay for a mitigation activity that offered "zero damage".

Finally, action-stimulating attitudes towards taking mitigation and preparedness measures did not show a straightforward relationship with actually taking such measures (Fişek et al., 2003).

2.7 Conclusions

The impacts of hazards are not just geological, meteorological or hydrological events; they do not only leave economic damage or casualties behind them; and disaster management is not just a technical matter. There are human and social issues relating to hazards which must also be well understood. Disasters cannot be managed only with technical measures such as an increase in the number of search and rescue personnel and ambulances. As well as other measures, a wise and an effective measure is to teach

communities and individuals about the pre- and post-disaster stages and maintain their active participation in mitigation and preparedness activities (Tekeli-Yeşil, 2007).

Since megacities are seen as hotspots of risk[6], special attention should be paid to them. As well as understanding their vulnerable aspects, it is important to determine and use the opportunities they provide.

As noted in sections 2.5 and 2.6 above, an earthquake is expected in the near future in Istanbul with an impact exceeding that of the earthquakes in 1999. According to the conceptual framework presented in section 2.2 above, this means that there is a risk of an earthquake occurring with a severe impact. Depending on the studies mentioned the inhabitants of the city know that there is such a risk and thus have a high risk perception and moderate awareness. If individuals personalize the actual risk, this high perception can lead them to make better preparations for the hazard; otherwise it is not a guarantee for critical earthquake awareness or for further activities. However, even if they are aware, they make little progress towards taking action. The studies presented in this paper show that there is some awareness in the community but not enough to trigger protective practices. Even though there is limited information about evaluation of the physical, psychological and economic costs and benefits of taking individual action, the role of home ownership in taking action might be interpreted as homeowners seeing more benefit in taking measures to mitigate any damage. The expected amount of reduction in damage resulting from mitigation measures is also an important factor at this stage. Although the situation about attitudes towards taking mitigation and preparedness measures is optimistic, studies show that they do not necessarily lead to action.

[6] See the press release *Megacities, mega hot* spots of 31 July 2007 from the Institute for Environment and Human Security of the United Nations University in Bonn (http://www.ehs.unu.edu/article:365) .

Possible factors responsible for the disruption between awareness and the following stages are the intervening personal, social and environmental factors in the framework.

Findings from the studies mentioned above and from other studies conducted in other parts of Turkey (Dedeoğlu, 2005; Kasapoğlu & Ecevit, 2001) as well as studies from around the world (Chan, 1995; Larsson & Enander, 1997; Lindell & Prater, 2000) indicate that socioeconomic and educational levels play a significant role in individual preparedness and influence almost all stages of the process.

Living in a high-risk area and experience with a high-magnitude earthquake seem to be motivating intervening factors. Past experience about disasters can be a starting point for many people, especially when they have had direct experience such as participating in rescue or solidarity activities after the event. Lack of trust in the construction sector and information sources acts as a hindrance in taking precautions. Considering the high level of trust in scientists and university institutions, they can be seen as potential actors to transmit the appropriate messages of mitigation and preparedness programmes. Findings about group dynamics and the positive effect of a nearby building being strengthened indicate the role of social interaction, which can also be helpful in persuading people to adopt precautions. Fatalism does not seem to play as important a role in disaster preparation as might be expected, although this needs further explanation.

Considering the literature mentioned in section 2.2 above, we can assume that there should be additional important factors instrumental in the gap between awareness and action among the population of Istanbul. Other than location (living in a high-risk area), there is no information about environmental factors such as suddenness of onset, normalisation bias or poor predictability. It is also known that personal beliefs and

perceptions, such as outcome expectancy regarding the measures and perceptions of the hazard as controllable or not are also important factors that influence the process of taking action, although there is limited information on personal factors. Furthermore, there could be additional social factors related to the characteristics of Istanbul or cultural phenomena in the community. These points need further investigation.

In conclusion, the involvement and active participation of individuals in any kind of preparedness and mitigation activities are vital for coping successfully with natural disasters. Preparations for reducing possible damage from hazards are extremely important in better disaster management. Individual preparedness for earthquakes and hazards is, however, a complex process, which is determined by many social, economic, environmental and personal factors. Thus it is important for disaster managers to identify barriers and motivations particular to their communities in order to communicate the risk successfully.

Finally, risk reduction is a community-based activity which involves participation, power sharing, legislation, organization and development planning. These factors mean that not much preparation can be expected in poor, powerless or marginal societies (Dedeoğlu, 2006). That is why preparing for disasters cannot be left to the individual alone: it is the duty of governments to strengthen the population's resilience and coping mechanisms. Thus for cities to be safer, individual activities regarding earthquake preparedness or other hazards should be supported by and integrated into governmental, institutional and communal preparedness. In this context, disaster risk reduction has to be seen as a political, economic and social issue, since disasters can only be coped with effectively when disaster management is integrated into social and economic development.

2.8 Acknowledgements

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PART II

STUDY AREA and METHODOLOGY

www.jsc.nasa.gov

3. Study area and methodology

3.1 Study area

Turkey is divided into seven geographical regions (Marmara, Aegean, Black Sea, Mediterranean, Central, Eastern and South-eastern Anatolia). The Marmara region in the north-west surrounds the Marmara Sea and includes the city of Istanbul. A narrow strip of water, the Bosphorus, separates the continents of Asia and Europe and divides the city of Istanbul (Figures 3.1 and 3.2)

Figure 3.1 Geological regions of Turkey

Source: http:\\harita.turkcebilgi.com

Figure 3.2 Marmara region

Source: www.turkeyarena.com

Main sociodemographic features of Istanbul were noted in section 2.4 above. In addition to these features, Istanbul is important to the economy of Turkey, with 21.3% of gross domestic product (IBB, 2001) – the second highest in the country – and approximately half of the largest industrial companies. However, it also has the highest income inequality (Sönmez, 1996). The high economic performance is one of the reasons for the population growth in this region: a considerable proportion of the residents of Istanbul are immigrants from all over rural Turkey. According to the results of the 2000 census, 62% of the population was not born in the city (DIE, 2002). Istanbul is also an important place in the history not only of Turkey, but also of the world, and there are many objects/sites of world inheritance.

Turkey is a land of earthquakes: nearly 96% of the country can be described as, in varying degrees, at seismic risks (Figure 3.3). Of this large earthquake zone, 66% consists of active fault systems, meaning that 70% of the country's population, including

the 11 provinces with populations of over 1 million and 75% of the country's industrial establishments, can be struck by an earthquake at any time (TBMM, 1999).

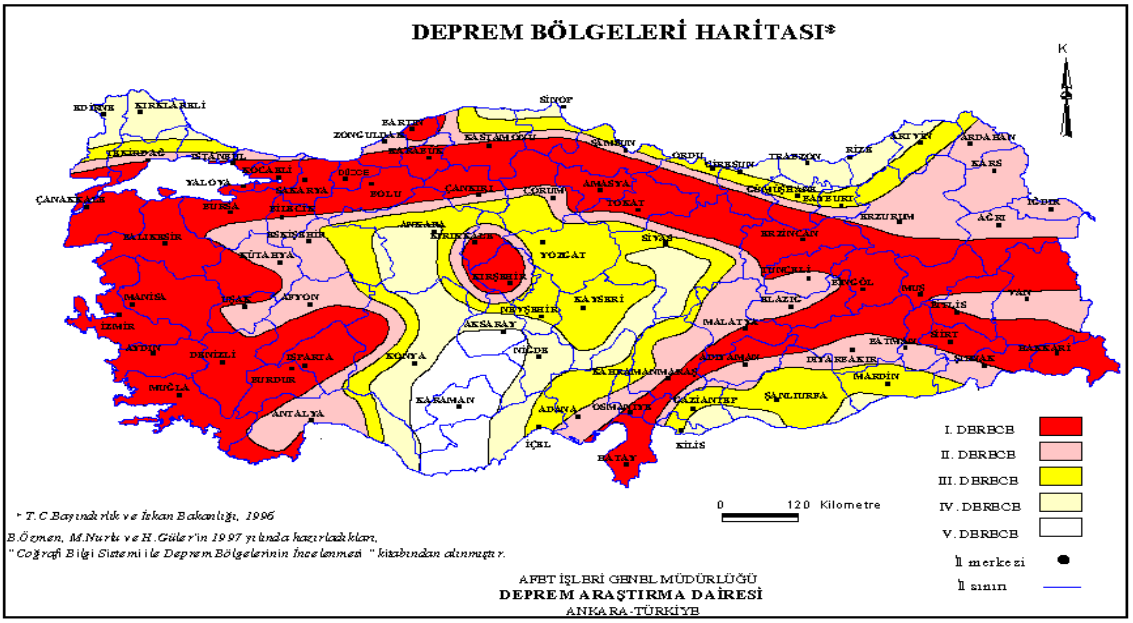

Figure 3.3 Earthquake zones of Turkey

Source: Afet Işleri Genel Müdürlüğü Deprem Araştırma Dairesi/General Directorate of Disaster Affairs, Earthquake Research Department http://www.deprem.gov.tr

(DERECE means degree; il merkezi, province centre; il sınırı, province boundaries)

The Marmara region is one of the most seismically active regions in the eastern Mediterranean (BU, 2003), and the Northern Anatolian Fault, which traverses the Marmara region, is one of the most seismically active faults in the world (Demirtaş & Yılmaz, 2004).

On Tuesday 17 August 1999 at 03.02 a severe earthquake with a magnitude of 7.4 on the Richter scale hit this region. The epicentre of the earthquake was near the town of Gölcük (Nurlu & et al., 1999). It lasted more than 45 seconds and affected the whole Marmara

region, surrounding cities such as Düzce, Bolu, Zonguldak, which are located to the east of the Northern Anatolian Fault, and Eskişehir (ITU, 1999). The earthquake was followed by more than 1000 aftershocks, some as high as 5.5-6.0 on the Richter scale (DAD, 2004).

Nearly three months later, on 12 November 1999 at 18.56 another earthquake with a magnitude of 7.2 on the Richter scale hit the town of Düzce not far from Istanbul. The epicentre of the earthquake was eight kilometres away in Düzce province (Nurlu & et al., 1999), so that it affected nearly the same region as the previous earthquake. This earthquake was also followed by many aftershocks.

Istanbul was not directly affected by these two earthquakes except in the Avcılar district. Due to its proximity and the availability of technical and logistical supplies and manpower, Istanbul could be of great assistance to the affected cities nearby.

The seismic threat to Istanbul has been heightened by these two earthquakes. As mentioned above, scientists forecast that in the near future a major earthquake could occur with a 62% probability (± 15%) of a magnitude of approximately 7 on the Richter scale in the vicinity of Istanbul.

According to this scenario, a total of about 35,000–40,000 buildings in Istanbul (about 5% of the total building stock) would be damaged beyond repair (complete damage). Most of the casualties would be expected in this damage group, especially in a subset where the collapse of buildings would be of the worst “pancake” form. The number of deaths would vary from 30,000 to 40,000; approximately 120,000 people would need hospitalization and between 430,000 and 600,000 households would be in need of shelter following the earthquake (BU, 2003).

As mentioned in section 2.4, the districts of Istanbul are located in different earthquake zones and, according to risk assessments, the intensity distribution of the predicted earthquake would vary from district to district (Figure 3. 4 and 4.2). Based on this site-dependent intensity distribution, we selected the districts of Bakırköy and Beykoz as research sites. Bakırköy is expected to be one of the districts experiencing the highest intensity (9.0–9.5) and Beykoz to be among the districts experiencing the lowest intensity (5.5–6.0).

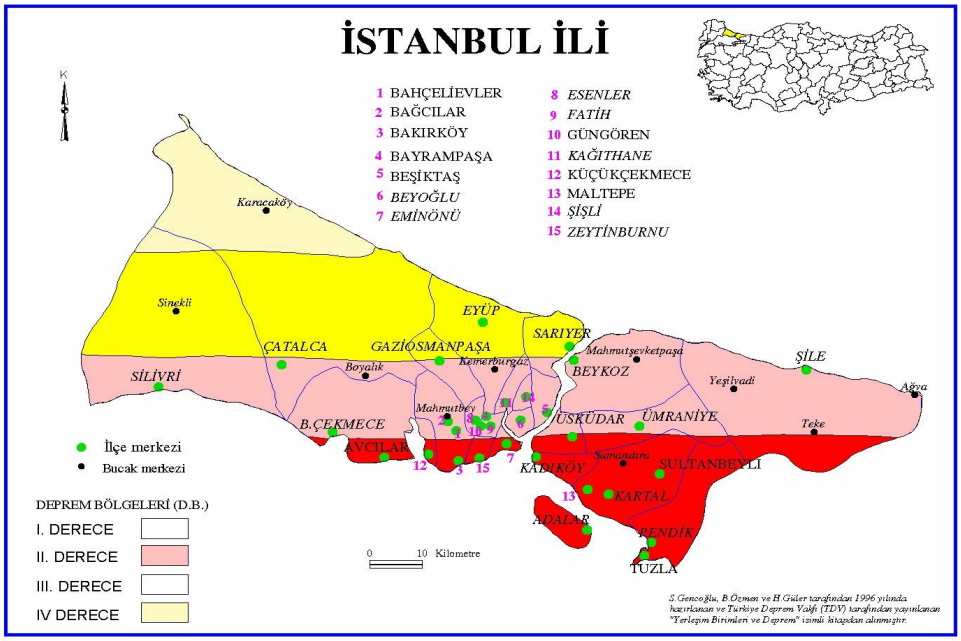

Figure 3.4 Earthquake zones of Istanbul

Source: Afet Işleri Genel Müdürlüğü Deprem Araştırma Dairesi/General Directorate of Disaster Affairs, Earthquake Research Department http://www.deprem.gov.tr

Bakırköy: Bakırköy is located beside the Marmara Sea, on the west (European) side of Istanbul, with a 35 km^2 surface area and a population of 208,233 (DIE, 2002) (Figure 3.5). It is one of the few districts where the population has fallen. With the Atatürk

airport, Ataköy marina, many industrial establishments and shopping malls, Bakırköy, is one of the most socially and economically developed districts of the city.

The neighbourhood of Osmaniye in Bakırköy was the third *gecekondu* area to be established in Istanbul's recent history due to the industrial establishments in this area (Sönmez, 1996). However, the recent trend towards moving industry outside the centre of the city combined with the economic value of this land has led to the *gecekondus* being replaced with regular buildings in recent years. Compared with other districts in Istanbul, other neighbourhoods in Bakırköy have quite regular buildings and planned settlements.

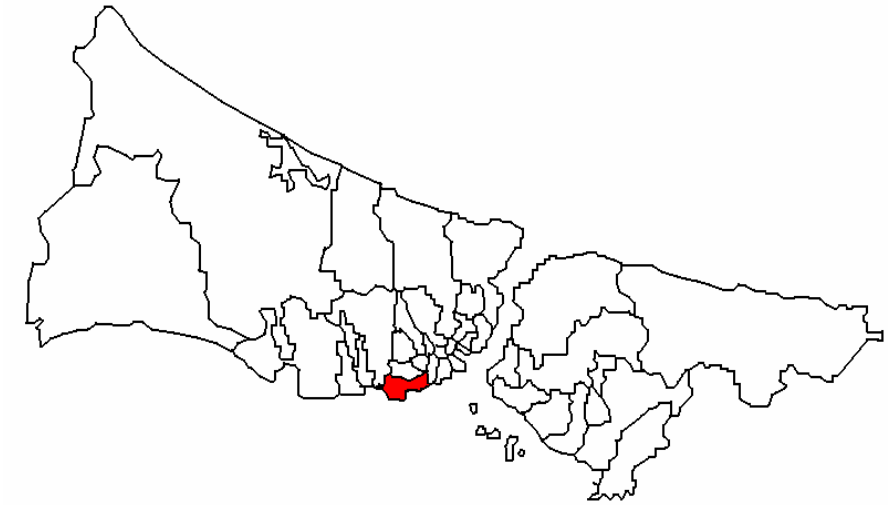

Figure 3.5 Location of Bakirköy

Source: http://mapsof.net

Beykoz: Beykoz is 435 km^2 in area and is located along the north-eastern (Asian) side of the Bosphorus (Figure 6). As a water basin with springs and forest, It is one of the least densely populated districts in Istanbul with a population of 217 316 in 2000 (DIE, 2002). It has been a popular district among immigrants and the population includes a range of socioeconomic levels. Along the Bosphorus, in the lower parts of the district, there are

older settlements with marvellous traditional timber architecture. Beside these old settlements, Beykoz was the first *gecekondu* area in 1940s on the Asian side of Istanbul (Sönmez, 1996). It is still dominated by the unplanned settlements and *gecekondus*, but owing to its low risk of earthquake it has become popular in recent years among high-income groups and many gated communities are being developed for the upper classes.

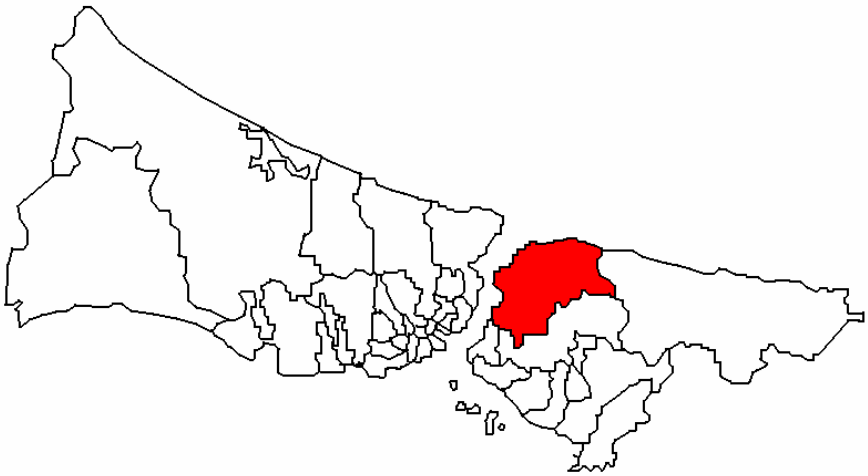

Figure 3.6 Location of Beykoz

Source: http://mapsof.net

3.2 Methodology

The methods used in disaster medical/health research have always presented a problem (Quarantelli, 2001), mainly because of two issues: firstly the history of such research, which is not very old and needs to be developed, and secondly the nature of disasters (Stallings, 2002; Sundness & Birnbaum, 2003). Although some natural disasters are to a certain extent predictable, many are not, but all strike more or less unexpectedly. Furthermore, disasters may be caused by a variety of events that are never exactly the

same and that involve different geographical areas, populations and cultures (Sundness & Birnbaum, 2003). In acknowledgment of these difficulties, the techniques that are commonly used in social sciences are now being incorporated into disaster medicine/health research. Following this approach, a combination of qualitative and quantitative methods has been used in this study to examine the research questions. Focus group discussions (FGDs) and interviews constituted the first (qualitative) part of the research and a survey constituted the second (quantitative) part.

In the high- and low-risk areas 12 FGDs and 11 in-depth interviews were conducted and a total of 1123 people were interviewed. Detailed information about the data collection process and the methodology of the FGDs and in-depth interviews is set out in section 4.5 below, and of the survey in section 6.2.

PART III

RESULTS of the QUALITATIVE PART of the STUDY

IBB, www.ibb.gov.tr

Part III has two chapters. The first (Chapter 4) is a paper accepted for publication in the journal *Disasters* containing the main findings of the qualitative study, which indicated that in the context of the framework presented above, the study subjects exhibited three different patterns in the process of taking mitigation and preparedness measures. Factors that inhibit individuals from taking action are outcome expectancy, helplessness, low socioeconomic level, culture of negligence, lack of trust, onset time–poor predictability and normalisation bias, while the factors promoting action are location, direct personal experience, higher education level and social interaction. Drawing on these findings, the paper provides key points for better communication relating to disasters including, but not limited to, whom to mobilise to reach target populations, such as individuals with direct experience of an earthquake.

In Chapter 4 it is not possible to mention all the issues that emerged during the FGDs and in-depth interviews, thus only the issues that were given the most weight in the discussions and interviews are discussed. However, some additional intervening factors that might also influence the process of taking action regarding earthquake mitigation of damage and preparedness at individual level were identified during the analysis. These factors were either less frequently mentioned or mainly mentioned as "others" experiences or thoughts, but they are important in understanding the factors affecting the way the population undertake mitigation and preparedness activities. They are presented in Chapter 5, where the roles of unrealistic optimism, transfer of responsibility to others, tenure (own/rent) and group dynamics in taking mitigation and preparedness action at individual level will be discussed.

4. Why are we not prepared? Identifying factors affecting individual mitigation and preparedness actions related to a predicted earthquake in Istanbul

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This paper has been accepted for publication in *Disasters*

4.1 Introduction

Rapid population growth, urbanisation, environmental degradation, poverty and social inequalities pave the way for the growing impact of natural hazards in our modern world. Global trends in natural hazards show that although there has been a decrease in fatalities, the number of people affected and the estimated damage from disasters have increased since the middle of the 20th century[7]. This has led to some changes in disaster management practice. In recent years, risk reduction (prevention of the hazard's impact, mitigation of the damage and preparedness for the hazard) has gained the most attention. It has been acknowledged that risk reduction comprises a continuous series of tasks carried out by the social, economic, governmental and professional sectors and is not, or should not be, the preserve of experts in various fields. This is why it was described in the context of the ISDR as a shared responsibility between governments, communities and individuals (ISDR, 2004). Corresponding to the ISDR definitions, studies and experience indicate that the active participation of individuals and the community is essential for the success of any kind of disaster management activity (Burningham et al., 2008). Unfortunately there are few examples of good practice. One side of the coin shows that a top-down approach is still most common in disaster/risk management, but the other side shows that people are often uninterested in and unwilling to take action for preparedness and to reduce risks (Dedeoğlu, 2006; Lehman & Taylor, 1987).

This paper focuses on that second side of the coin, with the overall aim of investigating the process of taking action for mitigation of damage from and preparedness for an earthquake at individual level in Istanbul, where scientists predict that there will be a

[7] http://www.emdat.be/Database/Trends/trends.html (27.02.08).

major earthquake in the near future (Parsons et al., 2000). The specific aim of the study was to identify the factors that encourage or inhibit individuals in this process. This paper draws on the first part of an ongoing study in Istanbul.

4.2 Background

Many studies in various countries with different economic and social profiles have investigated the factors that motivate or hinder individuals to take precautions for hazards. Despite the different nature of the countries and of the hazards investigated, certain characteristics related to human responses to hazards seem to be shared. Socioeconomic and educational levels, experience of hazards and demographic characteristics seem to be common factors identified by various studies in this field

Table 4.1 Selected literature on individual hazard preparedness and factors affecting the taking of action to mitigate and prepare for hazards

Type of hazard	Country/city	Factors	Reference	Comments
Flood	England & Wales	• Social class • Personal experience of the flood • Length of time in residence • Denial/rejection of 'at risk' status • Invisibility of the risk	Burningham et al. (2008)	The paper mainly focused on awareness.
Earthquake	Turkey/Istanbul	• Location • Demographic characteristics (age, tenure) • Educational level of individuals • Risk perception • Economic level • Earthquake experience • Direct experience	Kalaça et al. (2007)	Economic level (known socioeconomic level of the neighbourhood where respondents live).
Earthquake	Turkey/Antalya	• Age (only for awareness) • Earthquake experience • Educational level of individuals • Economic level of individuals	Dedeoğlu (2006)	Fatalism was not a major factor for action.
Earthquake	Turkey/Istanbul	• Not having capacities • Unfamiliarity with the community-based organisation • Lack of time • Fatalism • Lack of trust	Inelmen et al. (2004)	Participation in a relevant local community-based organization was investigated in the study.
Cyclone	Australia/Cairns	• Risk perception • Direct personal experience of a cyclone • Hazard awareness education	Anderson-Berry (2003)	
Earthquake	Turkey/Istanbul	• Educational level of individuals • Economic level of individuals (income) • Gender (only for risk perception)	Fişek et al. (2002)	Risk perception and attitudes do not show a straightforward relationship with action.
Earthquake	USA/southern California and western Washington	• Location • Demographic characteristics • Earthquake experience • Hazard intrusiveness	Lindell & Prater (2000)	All stated factors cause hazard adjustments within a causal chain.

Earthquake	USA/Los Angeles	• Demographic characteristics • See self as responsible • Outcome expectancy (efficacy of adjustments)	Lindell/Whitney 2000	Risk perception does correlate with intentions and action.
Volcanic eruption	New Zealand/North Island	• Direct personal experience (important for awareness; stimulates information-seeking) • Normalisation bias • Optimistic bias	Johnston et al. (1999)	Risk perception and knowledge do not show a straightforward relationship with action.
Earthquake	Japan/Tokyo-Yokohama USA/Los Angeles	• Economic level of individuals (income) • Perceived vulnerability of the home • Age (only in Japan, not in USA) • Sense of control over one's destiny (only in USA, not in Japan)	Palm (1998)	The paper mainly investigates the impact of culture on risk perception and action, and the differences between residents of Tokyo and Los Angeles.
Earthquake	Iran/Tehran and Rasht	• Fatalistic attitudes • Hazard perception • Economic status	Asgary /Willis (1997)	Economic status was significant only in one of the research areas.
Erosion	Bangladesh	• Economic level of individuals • Educational level of individuals • Experience of erosion • Helplessness/fatalism • Kinship • Dependence of cultivation	Mamun (1996)	Resettlement in safer areas was investigated in the study.
Earthquake	USA/California	For risk perception: • Risk communication factors (salience, message style and frequency etc.) For action: • Information-seeking • Social support and interaction (knowing other people taking measures)	Mileti & Fitzpatrick (1992)	Risk perception was important for information-seeking.
Earthquake	USA/California Los Angeles	• Denial • Poor predictability/onset time	Lehman & Taylor (1987)	

The studies presented in Table 4.1 demonstrate that individual preparedness for earthquakes or other natural hazards is a complex process determined by many interacting social, economic, environmental and personal factors. In this context, we have developed a conceptual framework which we used during the collection and analysis of data. The framework is illustrated in Figure 2.1; the details are discussed elsewhere (Tekeli-Yeşil, in press)[8] but can be explained briefly as follows. In the case of a risk of hazard occurrence, awareness of this risk – which covers knowledge about the risk and its consequences, how to cope with it and risk perception – is a pre-requisite to undertaking protective measures. The next stage is evaluation by individuals of the physical, psychological and economic costs and benefits of taking action. According to the results of this evaluation, the sequence might continue with a person's *attitudes* towards and *intentions* regarding taking action for mitigation and preparedness, followed by the action taken. Each stage and the transition phases can be positively or negatively influenced by intervening personal, social or environmental factors. Sometimes, as a consequence of a disaster or some other development, the action concerned may be followed by evaluation applied to all or some of the stages. The evaluation phase will not be considered in this study.

[8] Section 2.2 in this thesis.

4.3 Methodology

The study presented in this paper is the first part of a larger study. Here, qualitative research methods, namely FGDs and in-depth interviews (Bernard, 2000; Denzin & Lincoln, 2005; Kitzinger, 1995; Morgan, 1998; Tashakkori & Teddlie, 2002), were used to test the research questions.

4.4 Research site

Turkey is traversed by active faults, and in 1999 the Marmara region, in which Istanbul is located, was shaken by two severe earthquakes on 17 August and 12 November with magnitudes of 7.4 and 7.2 on the Richter scale, respectively. These earthquakes claimed nearly 18,000 lives and caused severe damage (T.C. Sayıştay Başkanlığı, 2002/3). Istanbul was only slightly affected by these earthquakes compared to other cities in the Marmara region, but some authors have estimated that there is a 62% (± 15%) probability of an earthquake of a magnitude ~7 on the Richter scale in the region in any 30-year period (Parsons et al., 2000). The province of Istanbul consists of one metropolitan municipality and 32 district municipalities. We selected two of these districts for the study (Figure 4.2): Bakırköy, located in the first-degree earthquake risk zone and expected to be one of the districts that would experience the highest intensity from the expected earthquake, and Beykoz, located in the second-degree risk zone and expected to

be one of the districts that would experience the lowest intensity.[9] Within the districts, there is a variety of neighbourhoods with socioeconomic status.

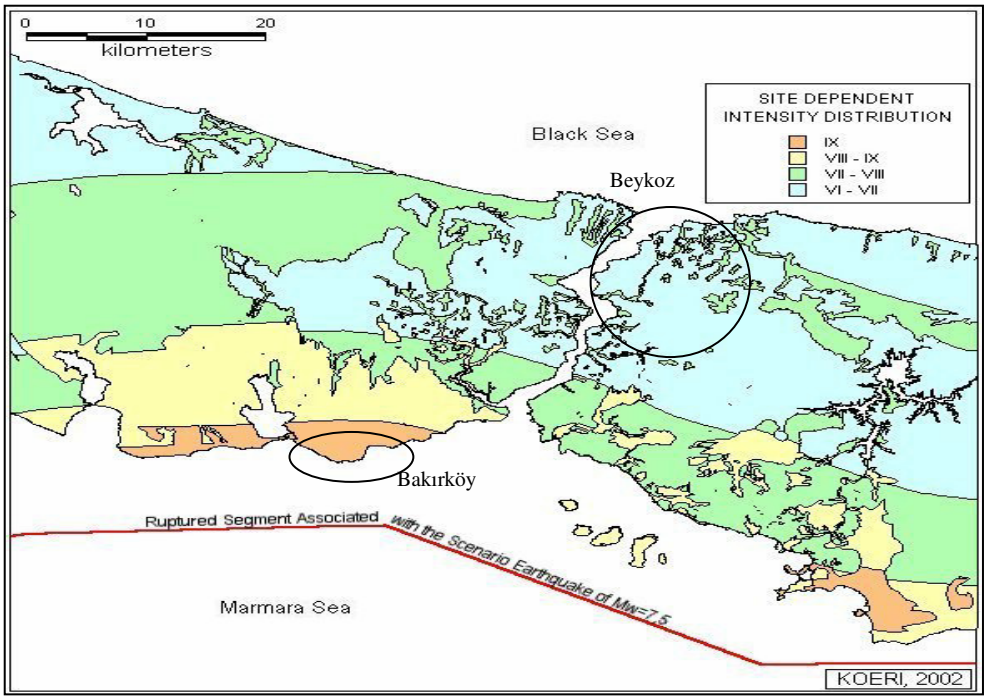

Figure 4.1 Istanbul, site-dependent intensity distribution of a scenario earthquake

Source: BU Kandilli Observatory and Earthquake Research Institute, 2003
(The location of research sites are marked approximately)

4.5 Sample and data collection

We conducted a total of 12 FGDs. The participants were recruited from existing social groups such as people working in the same place, members of a neighbourhood association or participants in a course, in the two districts. All participants were adults

[9] For detailed information about earthquake zones and expected site-dependent intensity distribution, see Afet İşleri Genel Müdürlüğü Deprem Araştırma Dairesi/General Directorate of Disaster Affairs, Earthquake Research Department (http://www.deprem.gov.tr; and B.U., 2003: Earthquake Risk Assessment for the Istanbul Metropolitan Area Final Report. Boğaziçi University Press, Istanbul

able to take decisions about their homes. We considered their economic status and educational level in order to assign the groups to a high, moderate or low socioeconomic level (SEL), based on information from key contacts about the participants' profiles (Table 4.2). We used a semi-structured question guide during all the discussions. The question guide was checked with a pre-test discussion and covered topics in the conceptual framework. The groups consisted of 6 to 10 people. Gender was not considered while building up the groups, although two groups consisted only of men and one group only of women. The other nine groups involved both men and women. Most of the discussions took place where the participants were likely to meet (e.g. a workplace or office of the association of which the participants were members).

Table 4.2 Distribution of focus group discussions

SEL	Bakırköy	Beykoz	Total
	No. of FGDs (No. of people participated in each FGD)		No. of FGDs
Low SEL	2 (8 + 7)	2 (10 + 6)	4
Moderate SEL	3 (7 + 8 + 6)	2 (10 + 8)	5
High SEL	2 (10 + 7)	1 (6)	3
Total	7 (53)	5 (40)	12 (93)

Additionally we carried out 11 in-depth interviews with authorities, experts in the social and natural sciences, administrators and those responsible for implementing various mitigation and preparedness programmes as well as other key informants.

All discussions and interviews were audiotaped with the permission of the participants and then transcribed verbatim. In all FGDs, besides the moderator, an observer was present to take notes and observe responses. The Maxqda® software programme was used in data management. Codes and sub-codes were organised according to the

framework of the study and the question guide to extract relevant sections for the analysis.

4.6 Results

Analysis of the collected data showed that participants did not follow a common path towards action. Within our conceptual framework there were three different patterns which the participants exhibited. The first and the most common pattern was interruption of the impetus towards action within or after the awareness stage. The second and less common pattern was that after the awareness stage respondents went forward to a subsequent stage or stages, but again the sequence was interrupted by intervening factors before they eventually took measures. The third and least common pattern was the completion of the sequence through to action. The results will be presented in the light of these three patterns. We will first discuss patterns 1 and 2 and factors that inhibit further steps to action. After that we will analyse pattern 3 and explore those factors that helped the participants and made it possible for them to complete the sequence. Citations from the discussions and in-depth interviews are provided throughout the text so that the respondents may speak in their own words.

Pattern 1: Interruption of the sequence after the awareness stage

The participants had relatively good knowledge about the risk of an earthquake and its consequences, but knew less about how they might adequately respond. Their knowledge was usually derived from the statements made by scientists in the media. They usually knew which parts of Istanbul were at what kind of risk: those from Bakırköy knew that

their district is at relatively more risk due to its proximity to the fault and less stable soil conditions, while those in Beykoz knew that their area is at relatively less risk. Participants also knew quite well what kind of consequences Istanbul would face in the event of an earthquake. They expected the damage to be somewhat localised and that it would be especially severe in locations where *gecekondus* are common. According to many participants, accessibility would be a big problem because roads and highways would be damaged or closed. They also talked about the eventual economic and psychological consequences. People mentioned that during the 1999 earthquakes, Istanbul was able to come to the aid of the cities affected, If Istanbul itself were to be severely affected, none of the neighbouring cities could act in the same manner since they lack the resources to do so and were also likely to be affected themselves.

Participants had less and in some cases only superficial knowledge about what to do to prepare for an earthquake or mitigate its damage. When people were asked about possible mitigation and preparedness measures, the most common measures that were mentioned were having an earthquake bag/kit and having the building tested for construction quality, followed by fixing high furniture to walls. However, even those who knew that an earthquake bag was an earthquake preparedness activity did not necessarily know what to put in it.

Although the general risk perception for Istanbul city was high in all groups, participants did not think that they themselves were at risk. Some of the participants who were at risk tended to rationalize their situation:

> "IB: ...a ground investigation was done here in Osmaniye *[a sub-district of Bakırköy]* by experts. They said, "Here is better than other parts of Bakırköy". Here is limestone, not stable and soft, but still it is better compared with other places in Bakırköy.
>
> FB: Here is the most solid ground within Bakırköy.
>
> EH: There were limestone-kilns; in the past, stone was obtained from here."
>
> *(FGD, conversation between a female and two male participants - Bakırköy–Moderate SEL)*

In-depth interviews confirmed the findings above: experts also thought that people knew the risk but that this did not lead to critical awareness and finally to action.

Pattern 2: Interruption of the sequence after the evaluation of costs and benefits and/or attitudes-intentions stages

Some of the respondents who were aware of the risk tried to take further steps. Most of the participants who could move forward to evaluation of costs and benefits stage gave priority to short-term needs. They preferred to invest their limited time and money in daily needs, not in the probability that an earthquake would happen in 20–30 years' time.

> "… Much research about Turkey has shown that our culture has low levels of future orientation… Especially the absence of the habit of future orientation, seeing everything in the context of today or interrelated with the past, is a very important factor. Perhaps it is not inappropriate in a country such as Turkey. As people have accepted this, they have authenticity. It is not possible to make plans, as done in countries like Sweden or Switzerland for 3–4–10 years, in a country that has to deal with continuous economic crises, disasters and social problems."
>
> *(In-depth interviews, male, scientist)*

In addition, some of the participants thought that taking some measures, such as keeping an earthquake kit, remind people when they see them every day of the threat and cause psychological problems. Instead of facing such problems they prefer not to take the measures:

> "PH: … another reason is the psychological issue. There is death at the end of such a disaster. To prepare for death is not something that everybody can tolerate. …"
>
> *(FGD, Female, Moderate SEL, Bakırköy)*

Although many of the participants showed positive attitudes towards precautions, few participants were inclined or intended to take steps towards earthquake mitigation and disaster preparedness. Some participants mentioned that if a cheap retrofitting credit were provided by the state they would like to retrofit their homes.

Small events, such as our discussions, may motivate people and refresh existing intentions.

> "AH: Personally I am thinking of taking further steps. Due to this discussion an earthquake bell is ringing in my ears. I will have a look at my earthquake bag."
>
> *(FGD, Female, Moderate SEL, Beykoz)*

Impediments in patterns 1 and 2

Among the intervening personal, social and environmental factors, those most evidently impeding further progress in patterns 1 and 2 are presented below.

Personal intervening factors

Outcome expectancy (absence of belief in micro-scale, individual and non-structural measures).

Almost all participants believed in mitigation and preparedness activities taken on the macro-scale, while many did not believe much in the effectiveness of measures taken on the small or micro-scales or at individual level. In addition, they believed more in structural (i.e. retrofitting the building) than non-structural mitigation or individual preparedness measures (i.e. fixing high furniture to the wall or keeping an earthquake bag).

> "SH: I do not understand, could you please explain it to me? I nail *(fix)* the shelf to the wall in order to prevent it falling on my head. What would happen if this shelf falls on my head when the building is collapsed? In Japan they say: 'that thing should not fall down, this thing should not injure me.' Building is strong in Japan, it does not collapse."
>
> *(FGD, Female, Moderate SEL, Beykoz)*

> "OB: Overall measures should be taken. Our houses are not the problem. When measures are not taken in total in your living environment, then the measures taken by yourself have no meaning. Unless an improvement (*restoration*) begins in the whole of Istanbul, the measures that we would take personally have no meaning."
>
> *(FGD, Male, Higher SEL, Bakırköy)*

However, in some cases, participants' explanations about their lack of belief in the effectiveness of measures and individual preparedness would seem to relate to transferring responsibility to others (e.g. the state, government or local authorities).

Helplessness

Fatalism or religious attitudes towards disasters did not seem important in disaster preparation. This comment needs some refinement, however, because helplessness was very common and in some cases openly expressed as fatalism, with helplessness as the underlying factor and fatalism the coping strategy. Several times during discussions we had to explore more deeply and clarify contradictions between fatalistic expressions and measures that were intended or had been taken. One type of response here was "first you have to take all possible measures and then trust in God". A second type is illustrated in the following examples:

> "MB2: Huh, helplessness we give up, it means helplessness you throw in the towel.....
>
> AB: It means, you acquiesce to everything from the beginning, for example you are a big/large man. Me? This man could beat me, it is so simple, when this earthquake comes, I can't do anything."
>
> *(FGD, Males, Low SEL, Bakırköy)*

> ZB: The Turkish people are in constant danger… Earthquakes are just one of these *(dangers)*. Therefore people living in the community should be a little bit fatalist. It should not be seen to be related with the religious attitude; otherwise (*if people are not a little bit fatalist*) we would all be mentally ill.
>
> *(FGD, Male, High SEL, Bakırköy)*

According to some of the respondents to the in-depth interviews, traumatisation and false perceptions about the damage also caused helplessness.

> "...Other than the people who went to Kocaeli *(the most affected area in the 17 August earthquake in 1999)* to join solidarity activities, most of the Istanbul residents witnessed the earthquake on television. This witnessing experience was a little bit traumatic and battering, because those who did not personally observe the consequences of the earthquake and only saw it on television, with screens of collapsed buildings and battered people images on televisions they perceived it as if Kocaeli had totally collapsed …"
>
> *(In-depth interviews, female, social worker, has coordinated public mitigation-preparedness programmes)*

Social and economic intervening factors

Low SEL

Taking action for mitigation and preparedness was not very common among participants with a lower SEL. Regardless of the district in which they lived, almost all of them had carried out either no or very few measures.

> "SB: I haven't seen any of my neighbours taking such measures for the earthquake, I also haven't heard about it from anybody. As I said a few minutes ago, it depends on resources … you know people earn their living with difficulty, nobody thinks about precautions. O.K., they know that an earthquake will hit, but, for example, my neighbour, now he is looking for a basement to rent, really nobody cares whether the walls are cracked or whatever it is."
>
> *(FGD, Male, Low SEL, Bakırköy)*

The experts who were interviewed were divided on this issue: those with engineering or administrative backgrounds indicated the importance of economic status, those who were implementing public preparedness programmes or investigating such programmes thought that there was no direct relationship between taking precautions and economic status.

> "We have seen that the most important problem is financial… We asked how important is it for you to arrange financial sources or credit support for the retrofitting: the response was 70% very important, 20% important… the only solution is financial support."
>
> *(In-depth interviews, male, engineer, coordinating a structural mitigation programme)*

> "…I don't have the impression that people without economic or material problems undertake such measures more comfortably or easier… The objection 'We don't have economic means to do this' arises when we work with low-income groups. But in reality this is just an L-profile *(an appliance to fix high furniture to the wall)*, simple to use, can be found in any market selling building materials, in any hardware store. Even when we explain this, the criticism 'We don't have economic means to use this' still comes up, but it is not really true. Again safety culture, I relate

> such objections to the fact that the cornerstones of safe attitudes in the community are not yet in place…"

(In-depth interviews, female, social worker, has coordinated public mitigation preparedness programmes)

Culture of negligence in the context of multiple and/or constant risks in the community

A culture of negligence, which can be described as ignoring security rules or safety regulations in general in many aspects of daily life, for example while driving or while working, was mentioned by the respondents to in-depth interviews and group discussions with different terms or examples (e.g. lack of a culture of safety). Owing to the multiple risks and/or constant threats in daily life, people and even institutions act in negligence of such risks. Unfortunately, as in a vicious circle, this culture of negligence is also increasing or reproducing the existing risks in daily life. Statements by the participants also focused on multiple risks in daily life as a reason for negligence.

> "OB: … In our community the problem is: this signboard can also fall down on my head *(as security measures may not necessarily be applied or controlled)*, I may also fall into a hole dug by the municipality *(and not covered later)*, I may also die because of a natural disaster. Here is a country full of surprises. Therefore earthquakes or such events are extreme things for us."
>
> *(FGD, Male, High SEL, Bakırköy)*

Lack of trust

Trust (in the institutions that plan, apply and control retrofitting projects or other preparedness programmes) was stated as an important determinant for making decisions in favour of mitigation of damage. Neither commercial nor public institutions have

gained individuals' trust. In group discussions it was also observed that scientists and universities enjoyed a high degree of trust among the participants, although recent conflicts between scientists about the magnitude and epicentre of the predicted earthquake have damaged that trust somewhat.

Environmental intervening factors

Onset time–poor predictability and normalisation bias

Earthquakes are sudden-onset hazards that strike at any time without warning. Measures should, therefore, be taken continuously: they cannot be seasonal or periodic. This was often mentioned as a hindrance to taking pre-emptive action:

> ÖB: ...Of course then (*if he could know when an earthquake will hit*) a measure would be taken, now what should the people do for an earthquake that will happen in 25 years? (*Showed his hands as if asking what?*) It will happen in 25 years, also what will I be till that time? Ha when scientists would say 'it will happen in 2 years' people adjust themselves according to 2 years not to 25 years. Now if they would say 'in 2 years the earthquake will hit' I would move to a new place, I would go to my village (*from which he immigrated*) the ground of my village is more solid.
>
> *(FGD, male, Low SEL, Bakırköy)*

Both in discussions and interviews it was stated that the risk was easily forgotten when life returned to normal after the earthquakes in 1999. Small earthquakes in Turkey or an earthquake somewhere else in the world might refresh people's intentions and actions, but these phases are usually short-lived.

> "This is a troublesome task, if I would give an example from myself; I carried a whistle, spare money with me all the time in the beginning. But even I leave the whistle behind when I change my bag. Even I, as a conscious educator, do this. My earthquake bag was ready and it was ready standing somewhere in the hallway, now it has been removed."
>
> *(In-depth interviews, female, disaster preparedness educator of a relevant association)*

> "We asked about the earthquake bag: in the first years *(after the earthquakes)* 50% of the participants raised their hands *(meaning they have an earthquake bag);* this fell to 0 more recently."
>
> *(In-depth interviews, female, coordinator, disaster preparedness education unit of a university institute)*

Pattern 3: completion of the sequence with action

As mentioned above, most of the participants had good knowledge about the risk of an earthquake and its consequences, but their knowledge about how to cope with earthquakes varied. Participants in groups with moderate/high SELs who had had direct experience of an earthquake were the best informed about how to cope with an earthquake. These people were also keener to acquire additional information. A respondent in an in-depth interview, who prepared and presented a weekly radio programme about mitigation of damage and earthquake preparedness, described his audience as being already interested in the subject, responsive and getting prepared.

Participants in groups with moderate and high SELs and those who had had direct experience of an earthquake demonstrated positive attitudes and more intention to take further action.

Many participants had taken some kind of action, but it is difficult to discuss the quality and completeness of these precautions. Although there was a difference in action taken between groups in Beykoz and Bakırköy (i.e. between low- and high-risk zones), there was a relatively bigger difference between SELs within and between these districts.

The most frequently mentioned precaution taken was keeping an earthquake kit/bag, which is also one of the best known preparations. The second most frequently mentioned precaution was fixing high furniture securely to walls. Placing large or heavy objects on lower shelves and storing breakable items in low or closed cupboards with latches were also mentioned, although less often, even though such measures cost (next to) nothing.

Geotechnical investigation of the building site, investigation of building quality and retrofitting the building were usually done by participants in groups with moderate and high SELs. However, some participants in groups with moderate or low SELs had done "building investigations" or "retrofitting" themselves or had them done by a friend with a relevant professional background (e.g. civil engineer, architect or foreman), but who might not necessarily be working in this specialised field.

Drawing up a plan about what an entire family should do and how to reunite during and after an earthquake was rarely mentioned and, when it was, mainly by participants with moderate or high SELs. Participants with a family plan tended to be those with children, but (very) few families had simulated or rehearsed their plans.

Other precautions mentioned included learning what to do during and after an earthquake. Earthquake insurance was not mentioned very often in discussions, although it is compulsory and some people mentioned that they did have it. Moving was rarely mentioned. Those that moved were either better off or moving was already on the

family's agenda. In these cases, a safe neighbourhood or a building known to be safe had been chosen. Some female participants mentioned learning how to shut off the gas and switch off the electricity. Having a fire extinguisher and learning how to use it, and taking earthquake training or participating in a voluntary group were the least mentioned activities regarding preparedness.

There were "extreme" precautions, especially among high-SEL participants, such as having a steel/iron shelter or their own rescue apparatus.

Experts who were interviewed thought that even though there are good examples of individual preparedness, a high percentage of people in Istanbul are totally unprepared for an earthquake.

Motivating factors for pattern 3

Among personal, social/economic and environmental intervening factors, the factors that most evidently motivate individuals to complete the sequence with action are presented below.

Personal intervening factors

Direct personal experience

In most of the groups, the participants demonstrating the highest level of preparedness and greatest motivation for taking action were those with some direct experience of the 1999 earthquakes. People who had experienced them directly (e.g. through losing close relatives or friends and/or participating actively in solidarity activities) and those who had

participated in the rescue efforts were more likely to take precautions and showed a greater intention to take further action.

> "SB: I was one of the volunteers who ran to act in solidarity the next day after the '99 earthquake. I was sent by the company (*for which he was working at that time*)… we didn't have any knowledge about organising rescue or solidarity activities, we couldn't do anything, we saw the disaster, we were in an incapable position, in terms of helping people, rescuing them, a terrible disaster, terrible damage. After this earthquake I thought about what I can do at home, I did some little things. I saw the disasters there after two earthquakes, also at Kaynaşlı (*a sub-district close to the epicentre of the second earthquake in 1999*), there my father-in-law died. After that I was more worried…"
>
> *(FGD, male, had undertaken many mitigation and preparedness measures at home, moderate SEL, Beykoz)*

> "EB: You asked us why we have been involved in the group *(a local, non-professional voluntary rescue team)*: To be conscious. I lost many relatives during the earthquake *(17 August 1999)*. The son of my uncle (*his corpse*) was brought out from the rubble after 27 hours and I was like this *(standing)* there, we couldn't do anything; we were waiting behind the red band and waiting for his body to come out."
>
> *(FGD, male, had undertaken many mitigation and preparedness measures at home, member of a local voluntary rescue team, moderate SEL, Bakırköy)*

Higher educational level

Mitigation and preparedness activities were more common among group participants with higher educational levels. Even within the groups with low SEL, those with more

education were more likely to take precautions. Awareness was clearly higher among participants with better education.

In-depth interviews also indicated that educational level plays a significant role, especially for knowledge about the risk, its consequences and how to cope with it.

Social intervening factors

Social interaction

Participants who had taken some measures had often tried to persuade those in their circle to take similar measures. Respondents had found it easier to take measures when they saw examples that persuaded them of the efficacy of such measures. For example, many participants did not believe that insurance would be beneficial or would function properly in the event of a big earthquake, but a respondent in a high SEL group in Beykoz had obtained compulsory earthquake insurance and additional private insurance both for his home and his workplace after seeing one of his friends, a commercial colleague, rebuilding his factory after the 17 August 1999 earthquake with money from his insurance claim.

Both in the groups and in-depth interviews, many participants had not seen examples of individual preparedness that would have motivated them.

> "In Turkey the majority don't believe, accept anything without having seen it. This is how we spread our impact: we have a strategy like the following: We select three neighbourhoods in each district. Because when these neighbourhoods are involved, the neighbouring neighbourhoods take the attitude 'we should get involved too'."
>
> *(In-depth interviews, male, programme manager of a preparedness project)*

Additionally, many of the interviews indicated that social interaction and social networks play a key role in the implementation of mitigation and preparedness programmes among women and in districts where traditional relationships are still alive. In almost all of the in-depth interviews, *muhtars*[10] were also mentioned as key persons to reach the public and different neighbourhood social networks.

Environmental intervening factors

Location of home

Although the difference in taking precautions between higher- and lower-risk areas was not great, more participants in Bakırköy (the higher-risk area) had taken some measures compared to participants in Beykoz (the lower-risk area).

4.7 Discussion

The study supplied very rich data, from which we have presented only the most prominent findings, but because of the nature of the qualitative methods we cannot generalise from these findings.

[10] A *muhtar* is the elected head of a sub-district/neighbourhood.

The study was designed to improve our understanding of the process by which individuals take measures to mitigate damage and be prepared. We considered the whole process and could not, therefore, go into great detail on any one theme, each of which deserves a separate investigation. Table 4.3 summarizes the findings of our study and the existing literature.

Table 4.3 Comparison of the study findings with the findings of cited literature

	Literature*	Our study
Obstacles		
Low SEL	√	√
Outcome expectancy (absence of belief in the efficacy of measurements)	√	√
Helplessness	√	√
Culture of negligence	No info	√
Lack of trust	√	√
Onset time/suddenness of onset	√	√
Normalisation bias	√	√
Fatalism	√/ 0	0
Motivating factors		
Location (living in higher-risk areas)	√	√
High risk perception	√/0	0
Direct personal experience	√	√
Hazard experience	√	0
Higher education level	√	√
Social interaction	√	√
*√ indicates association with taking action; 0 indicates no association		

The risk of an earthquake in the Marmara region was highlighted after the earthquakes in 1999 and information about it has been broadly disseminated among the citizens of Istanbul, including the participants in our group discussions. Participants displayed a considerable level of knowledge about the risk and its consequences and presented a realistic appraisal of the risk. In general, however, they were less well informed about how to cope with an earthquake themselves, although those with higher educational levels were better informed than those with lower educational levels. In our case, the

source of this knowledge may have been the flood of information in the media and through interpersonal discussions after the 1999 earthquakes. However, much of this information (which people did not seek so much as they were exposed to it) was about the consequences of the recent earthquakes or characteristics of the predicted one, and did not necessarily prepare people adequately for the next one. Mileti & Fitzpatrick's (1992) statement about information-seeking behaviour might explain this gap between knowledge of the risk and its consequences, and how to cope with it. Usually knowledge obtained passively had little effect on the taking of precautions, whereas knowledge obtained actively facilitated the process.

Risk perception for Istanbul itself among the participants was high, but in both districts risk perception for self was lower than risk perception for the city as a whole. High-risk perception for Istanbul did not seem to have an influence on taking action: risk perception only led to action if participants personalized the risk. Further research is needed to study the relationship between risk perception for self and the taking of protective measures, and how people personalise risk.

Our findings indicated that immediate or short-term benefits were quite important for decision-making regarding mitigation and preparedness activities. Additionally, for some individuals, taking preparedness measures might have psychological costs.

Even though economic status plays an important and direct role in the taking of structural measures, it should not influence many non-structural measures. Economic status was, however, often cited in group discussions as a barrier even for non-structural measures that would cost little or nothing. Here the role of economic status may be indirect, and educational level or outcome expectancy may be confounding this finding. The findings

showed that some of the building investigations were done by residents themselves or by friends with professional backgrounds but who were not directly responsible or appointed for carrying out such investigations. This might be understood as a sign of intention towards taking mitigation measures in the context of a lack of resources or the existence of economic problems. The difference among experts about the role of economic status seems to relate to the type of measure. Structural measures, given priority by engineers and administrators, cost more and hence they identified economic status as important, whereas their colleagues in less investment-intense areas did not. These differences highlight the importance of having a multidisciplinary approach in disaster management.

Some studies have identified fatalism as playing a role in disaster preparedness in Turkey (Inelmen et al., 2004), while others demonstrated that fatalism did not seem to be a major factor for earthquake preparedness (Dedeoğlu, 2006). Our findings showed that fatalism and religious attitude did not have a significant impact on mitigation and preparedness activities. Almost all participants, including those with a strong religious belief, were aware of the reasons for earthquakes and the causes of damage. A sense of helplessness was, however, very common and was sometimes expressed as if it were fatalism. Palm (1998) in her study in Japan, suggests that in some cultures acceptance of destiny does not imply passive acceptance of fate, but instead a realistic assessment of elements that one cannot control. This perspective may also apply in the scenario we investigated. Qualitative studies such as this one seem the most appropriate for a full exploration of such attitudes with all their contradictions and inconsistencies. On the other hand, witnessing the disaster through the media led to helplessness and disbelief about protective behaviour among some group participants. The images broadcast by television

gave rise to an inaccurate perception of damage and precautions. The impression given about the consequences of the 17 August 1999 earthquake in Izmit (Kocaeli) was that absolutely everything had been destroyed. Although there was a very high level of damage, in fact only 5% of the buildings were totally destroyed[11]. This false picture also fed disbelief in the effectiveness of mitigation and preparedness measures.

Group participants showed low levels of trust towards actors in the construction industry and its related services and towards sources of information. This problem is complex and requires more intensive investigation. Given the trust shown in general towards universities and scientists, these actors might play an important role in disaster communication.

Our findings about the role of the onset time and poor predictability in the taking of action support those of Lehman and Taylor (1987), who suggested that individuals at risk of being subject to a highly probable catastrophic event of unknown timing may cope with the threat through denial and obliviousness. The normalisation of life between the previous and the next damaging event also caused the group participants to forget about the risk or to perceive no urgency to act. Low levels of planning for the future generally in society (Inelmen et al., 2004) might be another explanation for why onset time and normalisation bias impede the taking of action.

In addition to existing findings in the literature, our study showed that a culture of negligence and the existence of constant multiple risks in daily life led group participants to take earthquake preparedness less seriously or to give it less priority in relation to other

[11] BU., 2003: Earthquake Risk Assessment for the Istanbul Metropolitan Area Final Report. Boğaziçi University Press, Istanbul.

risks. Group participants tended to be unconcerned about various risks in their daily lives and did not take security measures in other aspects of life (e. g. while driving). A high percentage of smoking (PIAR, 1998; TUIK, 2009) and low percentage of safety belt use while driving a car (TAM, 1999) in Turkey underline these statements by group participants and experts about the culture of negligence.

In the groups, educational level, direct experience with an earthquake and socioeconomic level were all found to play key roles at almost all stages of taking action.

After the two earthquakes in 1999, many people went to the disaster areas either to search for their relatives/friends or to offer support and thus witnessed the impact of the earthquake directly. Among the group participants this experience was a strong motivating factor for earthquake preparedness. The experiences of such individuals could be mobilised to reach different groups in sub-districts or neighbourhoods.

Our data indicated that social interaction and social networks were important factors motivating our group participants to undertake protective measures. Women and *muhtars* were mentioned as key persons for social interactions. Further research is needed to examine how such interactions function among different social groups in order to enhance the effectiveness of public programmes.

In conclusion, our findings mainly correspond with earlier studies about the roles of socioeconomic and educational levels, outcome expectancy, helplessness, lack of trust, suddenness of onset, normalisation bias, location, direct personal experience and social interaction. Additionally a cultural phenomenon – negligence – was also found to be associated with failure to undertake earthquake precautions among the group participants.

4.8 Recommendations

In the disaster community, it is widely acknowledged that hazards trigger disasters when they meet with vulnerability, hence the basis of disaster management is the reduction of vulnerability. Our study showed that lower socioeconomic and educational levels, which are commonly listed as components of vulnerability, are the main factors hindering participants in taking precautions for earthquakes. But the causes of such vulnerability are rooted in international and national political, economic and social factors[12] which are beyond the scope of this paper. Our recommendations below are, therefore, for practical approaches to enhance existing mitigation and preparedness programmes and for further research.

Our study has pointed to two main problems with current public activities that aim to increase risk awareness and corresponding mitigation and preparedness activities. The first is the content of such activities. Any kind of activity that aims to increase public awareness should focus more on what individuals can do to prepare themselves or to reduce their own losses rather than on information about the actual risk and its features, about which people already have some knowledge, without excluding the latter.

The second issue is how this information is communicated. Awareness is a prerequisite for taking action but conventional awareness programmes that merely disseminate information are not very useful in helping people take further steps. Such programmes should take into consideration the socioeconomic and educational levels of target populations and use interactive methods so that people can personalize the risk and gain

[12] For detailed information on the components of vulnerability and their linkages to root causes see Wisner et al, (2003).

the ability and self-confidence to cope with it. Women, *muhtars* and people who have had direct experience of an earthquake are some of the key people to mobilise to reach target populations. Scientists, who enjoy a high level of trust, might also be actors in disaster communication, although their messages should be about measures to take rather than confusing information about fault lines and the magnitude of the predicted earthquake. Mitigation and preparedness programmes can involve some methods that allow social interactions to function, such as persuasive examples of successful action taken by both ordinary people and public figures that clearly explain the effectiveness of the measures. Social interaction might also be used to disseminate information among traditional neighbourhoods and women. In view of the statements in the groups about belief in the effectiveness of macro- rather than micro-measures, state institutions should also set an example to the public by carrying out both structural and non-structural measures and fulfilling their responsibility to safeguard citizens' lives and wellbeing.

It seems that keeping the earthquake hazard on the agenda through frequent messages to the public encourages people to be prepared.

People tend to take precautions which do not cost much time and money. If more extensive precautions, such as retrofitting buildings, were subsidized, more people might take them. Investments should be made in developing easier methods of mitigation and preparedness. Efforts to overcome the culture of negligence and create instead a culture of safety in the community would help not only in the taking of precautions regarding earthquakes, but also in many other measures related to various daily risks. Schools might be a starting place for such actions. Safety in daily life (in traffic, at home, in the neighbourhood, related to natural hazards, etc.) could be integrated into the curriculum.

All of the issues raised in this paper might be investigated in more depth, but we particularly suggest further research on the following issues: (i) the relationship between the perception of risk for oneself and taking appropriate measures; (ii) how people personalise the risk; and (iii) lack of trust and how to overcome it in disaster communication.

Finally, we suggest further research about the quantification and generalisation of our findings in this paper.

5. Additional findings from the qualitative part of the study

It will never happen to me

This section discusses the role of unrealistic optimism, transferring responsibility to others, tenure (ownership/rental) and group dynamics in taking mitigation and preparedness action at individual level. As the background and the methodology of the study were explained in the previous chapter they will not be repeated here.

5.1 Results

Unrealistic optimism – optimistic bias

As mentioned in the previous chapter, even though participants had a high perception of the risk in Istanbul, they did not perceive a high risk for themselves. A parallel finding about this issue is the unrealistic optimism expressed by some of the participants. Some thought that such things only happen to others, so their suggested solutions or expressed worries related to others.

> Campaigns can be organised, everybody can help these people (*people who are living in gecekondus*). TOKI *(Housing Development Administration of Turkey that produces social housing)* can build houses for these people.
>
> *(FGD, Female - Bakırköy–High SEL)*

> Can we live without hope? The earthquake will hit, but we have the hope that nothing will happen to us.
>
> *(FGD, Female - Beykoz–Moderate SEL)*

> I think I will be affected intensively, but I guess that I would not die. Probably I would not die.
>
> *(FGD, Female - Beykoz–Lower SEL)*

Transferring responsibility to others

Almost all groups spoke about transferring responsibility to others (e.g. the state, government or local authorities), but this was mainly raised in the groups with lower SELs. In many groups, participants said it was the responsibility of state institutions to take the first steps regarding earthquake preparedness. They would then follow suit. This was also stated as a reason for why the public is not doing much about individual earthquake preparedness.

> They *(state /municipality)* have to investigate our buildings in order to identify existing or possible damage. We want our building to be investigated.
>
> *(FGD, Female - Bakırköy–Lower SEL)*

> As we do not have the consciousness of being a citizen, we are not involved in such tasks. We have the habit of waiting such task from others.
>
> *(FGD, Female - Bakırköy–Moderate SEL)*

> Think about that; what would the people do, who sees virtually that such measures have been taken around them? They would also behave in the same manner, it is very natural. You are within a war, but do either the army or the government or the municipality act as if there is a war? You cannot understand that a war is going on. You can only understand when a bomb falls on your head.
>
> *(In-depth interviews, male, programmer and presenter of a weekly radio programme about earthquake preparedness)*

Tenure

Participants who had taken some structural measures such as retrofitting their homes were mainly homeowners. On the other hand, some of the tenants mentioned the difficulties of taking measures in a rented dwelling, such as opposition from the landlord to attaching weighty things to walls so that they could not fix high furniture securely. Others said that they moved frequently so they had not taken many precautions. Almost none of the tenant participants had earthquake insurance.

> I hadn't taken anything *(any precautions)* for mitigation of the damage. The house is not mine and I do not have the possibility to move out. When that day comes *(when earthquake hits)*, if I were safe *(after the event)* then I will do what I have said *(during the discussions he told about some preparedness to survive after the event)*
>
> *(FGD, Male - Beykoz–Lower SEL)*

> I am a tenant, I want to do *(take precautions)* but even if I want I cannot hammer a nail, hang a picture. Then, I will do when I own my house…
>
> *(FGD, Female - Bakırköy–Upper-moderate SEL)*

Group dynamics (in blocks of flats)

The building stock of Istanbul consists mainly of blocks of flats, so most of the group participants were flat-dwellers. They discussed the difficulty of taking common decisions about structural measures regarding the building. The main reason for disagreement was cost.

Experts also mentioned this point as an impediment to taking structural measures in multistorey buildings, but they also pointed to recent developments regarding changes in the regulations making it possible to take such action without a consensus in case of safety needs.

> ZB: I have interrupted you, but the house belongs to him (*talking about the house of SB)* and it is a single house, therefore he has such a possibility.
>
> SB: I have the chance; I am not dependent on anybody. Mr. C lives in a house with six apartments, for a small thing six people have to come together and agree on, it is not possible. I have a very exceptional position.
>
> (FGD, Males–Beykoz–Moderate SEL)

5.2 Discussion

These additional findings also showed that the process of taking mitigation and preparedness measures in anticipation of an earthquake is influenced by many intervening factors. Some of the group participants showed unrealistic optimism about the personal consequences of the predicted earthquake. This finding is possibly linked with the low levels of risk perception for self mentioned in the previous chapter. As a consequence of this optimistic bias, some of the participants behaved as if such things usually happened to others and did not accept the risk for themselves. Comparable unrealistic optimism has been found in other studies (Burger & Palmer, 1992; Burningham et al., 2008). Additionally, Spittal and colleagues (2005) discussed the similar role of unrealistic optimism regarding judgments about levels of individual preparedness. In order to overcome the optimistic bias the messages used in public

disaster mitigation and preparedness programmes should communicate the risk appropriately. Messages should contain visible and concrete examples based on experience emphasizing that everybody is at risk, not just others. Past experience drawn from anti-smoking or safety-belt use campaigns may be useful in how to communicate the risk.

Inelmen and colleagues (2004) also discussed transferring responsibility to state institutions in their study. They explained this situation with the cultural phenomena "expecting actions from state in many areas". Even though state institutions play the main role in reducing risk, the community and individuals should also be part of any risk reduction activity. An additional explanation may be the relationship between transferring responsibility to central authorities and believing in macro-measures (mentioned in the previous chapter). Some people might give value to macro-measures and see the state or government as responsible for earthquake preparedness. Further research would be valuable to understand an eventual correlation between these two issues.

Structural measures need investment, so such investments have mainly been made by home owners, not by tenants of a landlord who generally see their situation as temporary. Similar findings were found in the study of T.C. Başbakanlık PUB (2005) and Larsson & Enander (1997). Information about the regulations to ensure the safety of buildings could be included in public preparedness programmes so as to show tenants and people living in multistorey buildings what they could do in case of disagreement. The opposition of landlords to some activities related to preparedness measures, such as fixing high furniture to the walls, may be the justification for tenant participants' lack of action.

As also mentioned in Öncüler's (2002) study, the carrying out of mitigation activities in multistorey buildings is a collective decision but getting agreement among many people is not an easy task. The recent change in the regulations allowing for action to be taken with the approval of a majority of the residents could be an encouraging development, but in such settings the taking of taking precautionary measures is still a collective process and the role of group dynamics must be taken into account.

In conclusion, the process of taking action is highly complex, so that individual preparedness is a difficult task both for individuals and for those charged with implementing preparedness programmes who try to ensure that the public is prepared. Instead of passive information campaigns and programmes, disaster management agencies can design preparedness programmes that allow for the active participation of individuals and the community, thus getting them to accept the risk to themselves and share responsibility, and to empower them such that they are willing and able to overcome the problems in the process. In order to set up such programmes, multidisciplinary teams are needed which include, inter alia, experts in communication.

PART IV

RESULTS of the QUANTITATIVE PART of the STUDY

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In Part IV the findings of the quantitative study are discussed. The paper in Chapter 6 has been submitted to the journal *Risk Analysis*.

A field survey was carried out in 2007 in two districts of Istanbul with different levels of earthquake risk; within these districts three socioeconomic levels were considered. A total of 1123 people were interviewed face to face.

Analysis indicated that educational level of the respondents was the leading factor associated with taking at least three measures, followed by: living in a higher earthquake risk area, participating in rescue and solidarity activities in past earthquakes, a higher earthquake knowledge score, home ownership, living in a neighbourhood with higher SELs, a higher action-stimulating attitudes score and general safety score, and being in the young age group, in that order.

The findings pointed to the role of knowledge about earthquakes and possible mitigation/preparedness measures, hence the importance of developing effective awareness programmes. These programmes should also consider the characteristics of different groups in the population. Motivated individuals, such as those who have participated in rescue and solidarity activities in past earthquakes, could be involved to reach other people.

6. Factors associated with individuals' practices regarding mitigation of damage and preparedness for an earthquake in Istanbul

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This paper has been submitted to *Risk Analysis*.

6.1 Introduction

An earthquake is expected to strike Istanbul in the near future. Some authors predict an earthquake of a magnitude of ~7 on the Richter scale with a 62% (±15%) probability in any 30-year period in the Marmara region, where Istanbul is located (Parsons et al., 2000). The last destructive earthquakes in the region were on 17 August and 12 November 1999, although Istanbul then suffered only minor damage. However, one scenario for an expected earthquake predicts that there would be 30,000–40,000 casualties, more than 120,000 injured people needing hospitalization and more than 600,000 households in need of shelter in Istanbul (BU, 2003).

Although damage from earthquakes and loss of life can be reduced to a great extent by mitigation and preparedness activities such as retrofitting buildings, fixing high furniture to walls and drawing up a family disaster plan, national and international studies have shown that people appear to be unconcerned to prepare themselves (Dedeoğlu, 2006; Lindell & Perry, 2000). Little is known about the factors associated with this neglect. Previous studies have argued that factors associated with motivating individuals to take action[13] include: residence in higher earthquake risk areas (Kalaça et al., 2007; Lindell & Prater, 2000); higher income or socioeconomic status, higher educational level, home ownership (Dedeoğlu, 2006; Fişek et al., 2003; Palm, 1998); age (Kalaça et al., 2007); being male, having a child at home, being married (Lindell & Whitney, 2000; Lindell & Prater, 2000; Russel, Goltz, & Bourque, 1995); experience of an earthquake such as suffering damage or losing loved ones in previous events (Kalaça et al., 2007; Lindell &

[13] In this paper the term taking action is used to describe action of taking measures by individuals to mitigate damage and to be prepared for earthquakes.

Prater, 2000); and social support and interaction (Mileti & Fitzpatrick, 1992). Factors associated with not taking action have been stated as: doubts about the effectiveness of the measures – outcome expectancy (Lindell & Whitney, 2000); denial, poor predictability and infrequent occurrence of the event (Lehman & Taylor, 1987); and fatalism (Asgary & Willis, 1997).

Many studies have mentioned awareness and the level of knowledge about mitigation and preparedness measures among their respondents but there are no data showing the relationship between level of knowledge and taking action. Some studies have shown that high risk perception is associated with taking action (Kalaça et al., 2007). The taking of other risks, such as smoking and not using a seatbelt while driving, have also been studied and correlations have been found between not using a seatbelt and not taking action against earthquakes (Kalaça et al., 2007).

Most national and international studies have been conducted either in selected populations, such as among university students, or within a small sample size or have only looked at specific factors such as risk perception. A few have looked at a range of factors, although either these were not studied within a framework or some eventual predicting factors were not included. This paper, therefore, has the advantages of a random population, appropriate sample size and study design. A conceptual framework was used for the collection and analysis of the data. In addition, a qualitative study (Tekeli-Yeşil, Dedeoğlu, Tanner, Braun-Fahrlaender, & Obrist, in press) carried out prior to this quantitative one in the same districts and socioeconomic levels guided the preparation of the survey instrument and supplied us with more information about how individuals in the study area are motivated to take action.

In our qualitative study we conducted focus group discussions and in-depth interviews and found that within our conceptual framework about taking action (Tekeli-Yeşil, in press) respondents showed three patterns of behaviour. In the first two patterns, the process of taking action was interrupted at different stages by associated obstacles (low SEL, outcome expectancy – absence of belief in the efficacy of measures, helplessness, a culture of negligence, lack of trust, poor predictability and normalisation bias). In the third pattern, factors such as living in higher-risk areas, direct personal experience of an earthquake (participating in solidarity or rescue activities after past events), higher educational level and social interaction played a motivating role in completing the process (Tekeli-Yeşil et al., in press).

The overall aim of the present study is to identify the factors associated with taking action for earthquakes through an appropriate quantitative study. We assumed that the actual level of earthquake risk and respondents' SEL are associated with taking action, but based on the literature and our qualitative study, we expected that some further personal, social and environmental factors would also be associated with taking action.

6.2 Methods

A field survey was carried out in May and June 2007 to test the research questions. A questionnaire created by the authors was used as the survey instrument.

6.2.1 Research site, study design and procedure

Two of the 32 districts of Istanbul, Bakırköy and Beykoz, were selected for the study because of their different earthquake risk levels[14]. The sociodemographic features of these two districts are not identical, but it is not possible to find districts with similar sociodemographic features and different earthquake risks. Compared with other districts, Bakırköy contains regular buildings and planned settlements, the educational and economic levels of its inhabitants are in general above the city's average, and the population is older than that of Beykoz[15]. Beykoz has a diverse building stock ranging from gated communities away from the main urban centres to valuable older settlements with traditional timber architecture on the Bosphorus coast, as well as unplanned settlements and slum areas (*gecekondus*) which are built illegally, mainly on public land. In recent years, because of its low earthquake risk, Beykoz has become popular among high-income groups and many gated communities have begun to develop for them.

Bakırköy is expected to be among the districts experiencing the highest intensity in an earthquake, while Beykoz is expected to be among those experiencing the lowest intensity[2]. In these two districts we categorized sub-districts (*mahalles*) according to SEL. The high, moderate and low SEL categorisation was based on information gathered from the district administrations (Figure 6.1).

[14] In this paper, the term "risk" is only used in connection with geological/tectonic aspects. Detailed information about earthquake zones and expected site-dependent intensity distribution can be found at BU., 2003: Earthquake Risk Assessment for the Istanbul Metropolitan Area Final Report. Boğaziçi University Press, Istanbul.

[15] 2000 Census of Population / Social and Economic Characteristics of Population; State Institute of Statistics Prime Ministry Republic of Turkey, Ankara, 2002.

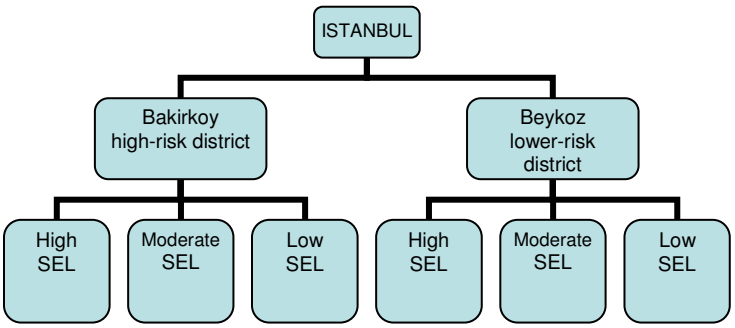

Figure 6.1 Stratification Process

After the stratification process, households were selected randomly from each stratum by a two-stage cluster sampling technique. Sub-districts and streets were taken as clusters. We randomly selected 2 sub-districts for each SEL category in both of the districts, then 10 streets within each selected sub-district. Finally, in each street a house was randomly designated as the starting point and recruitment continued at the nearest house. We aimed to interview a total of 1200 households, 200 in each stratum, speaking to individuals who were heads of households and had been living in their homes for more than one year. The questionnaire was administered face-to-face by trained interviewers with medical or anthropological backgrounds who had participated in a two-day training workshop and field exercise. Experienced and trained researchers served as field supervisors, each one working with two to four interviewers. Overall supervision in the field was conducted by the corresponding author.

6.2.2 Questionnaire and measures

The 56 questions were drawn up on the basis of the findings of our qualitative study and the conceptual framework created for the overall study. The questionnaire was tested with a small pilot population for appropriateness of inventory and changes made as necessary before it was carried out in the study population.

In order to assess the level of preparedness of each participant, we listed 11 earthquake mitigation and preparedness measures that are commonly mentioned in preparedness information booklets. The list included structural measures such as having the building tested for construction quality, non-structural measures such as fixing high furniture to walls, and preparedness measures such as keeping an earthquake bag/kit. For analysis of the data, a summary of the number of measures that each participant had taken was made and a dichotomized outcome variable, which we called *taking action*, created from the answers. The taking of at least three measures was the cut-off point (mean: 3.2, SD: 2.3). Respondents who had taken at least three measures were considered to have taken action.

The questionnaire included the following explanatory variables.

a) *Demographic and socioeconomic characteristics*. These included age, sex, marital status, a child living at home, SEL of the relevant sub-district, tenure and educational level.
b) *Experience with earthquakes*. We asked respondents whether they had ever experienced an earthquake, experienced damage, loss or injury in their close circle due to earthquakes, or participated in solidarity or rescue activities after such an event.

c) *Earthquake knowledge score*. Respondents were asked three questions to assess their knowledge about earthquakes. The first was about the causes of an earthquake: respondents could choose answers ranging from scientific to religious explanations, or give answers in their own words which we categorised later. The second question was about knowledge regarding possible mitigation and preparedness measures. We recorded respondents' spontaneous answers on a list that was not read to them. The third question was about how to behave during an earthquake. Respondents chose answers ranging from "don't know" to "drop to the ground, take cover under a sturdy table or other piece of furniture, and hold on until the shaking stops" (this last taken from information booklets). Respondents who gave a scientific explanation as a cause of an earthquake, who could spontaneously mention at least two mitigation and preparedness measures, and who could describe how to behave during an earthquake by an explanation from the information booklets got one point for each question. The points were then totalled. Respondents who got at least two points were considered as having above average knowledge and the rest below average.

d) *Risk perception score.* Risk perception was explored by six statements about risk perception. Respondents were asked to agree or disagree (on a three-point scale) with statements about risk perception for the district, sub-district, family, self and the building they were living in. Those who agreed with at least three statements were considered as having a high perception of risk.

e) *Attitudes towards action score.* The questionnaire contained 11 statements about attitudes towards taking action. These included attitudes towards different types

of measure such as structural and non-structural measures and micro- and macro-measures, fatalism regarding earthquakes and actors in disaster management. Respondents who agreed (on a three-point scale) with at least seven attitudes that previous studies had considered as action-stimulating were regarded as more inclined to take action than the average for the study population.

f) *Respondents' own statements* about reasons for not taking precautions.

g) *General safety score*. This was assessed by the use (or not) of seatbelts while travelling in the front seats of a car during the previous month[16].

6.2.3 Analysis

The statistical software SPSS® 15 was used to enter, clean and analyse the data. Ten per cent of the data were re-entered to check the quality of the data-entering process; only minor differences were identified, which were corrected before the analysis.

For descriptive information, frequency analysis and cross-tabulations were made. For cross-tabulations, statistical significance was determined using the chi-square test. The association between taking action and independent variables was assessed in a univariate analysis. The results of this analysis are expressed as odds ratios (OR) and their 95% confidence intervals (CI). A multivariate logistic regression analysis was then made, using the option *forward LR* (log likelihood ratio) in the logistic regression command. All significant variables with a p value smaller than 0.05 were entered into the multivariate analysis. The variables were entered sequentially.

[16] In Turkey it is only obligatory to use a seatbelt in the front seats of a vehicle.

6.3 Results

Response rate

A total of 1123 people were interviewed. The response rate was 93.6% (93.5% in the high-risk district and 93.6% in the lower-risk district). The response rate was slightly lower in both of the high SEL sub-districts because some of the gated communities did not allow access (high-risk district: 91%; low-risk district: 83.5%).

Socioeconomic and demographic characters of the study population

An approximately equal number of respondents lived in the high-risk and lower-risk districts. Their mean age was 48 (SD: 15). The middle age group (35–54) was the largest age group, with 46% of the total. The characteristics of the study population are presented in Table 6.1.

Of the respondents, 89% had experienced an earthquake but only 6% had suffered any damage or knew someone who had been injured or died in an earthquake in their close circle; 19% had participated in solidarity or rescue activities during the major Marmara earthquakes of 1999.

Table 6.1 Study population

	High-risk district, Bakırköy 561; 50% (n; %)						Lower-risk district, Beykoz 562; 50%						Total*1123	
	Low SEL 195; 34.8%		Moderate SEL 183; 32.6%		High SEL 183; 32.6%		Low SEL 198; 35.2%		Moderate SEL 197;35.1%		High SEL 167; 29.7%		1123	
Sex														
Male	77	**39.5%**	55	**30.1%**	104	**56.8%**	117	**59.1%**	136	**69.0%**	85	**50.9%**	574	**51.1%**
Female	118	**60.5%**	128	**69.9%**	79	**43.2%**	81	**40.9%**	61	**31.0%**	82	**49.1%**	549	**48.9%**
Age														
16–34	49	**25.1%**	35	**19.3%**	13	**7.1%**	58	**29.3%**	55	**27.9%**	31	**18.6%**	241	**21.5%**
35–54	93	**47.7%**	67	**37.0%**	88	**48.1%**	88	**44.4%**	97	**49.2%**	85	**50.9%**	518	**46.2%**
≤55	53	**27.2%**	79	**43.6%**	82	**44.8%**	52	**26.3%**	45	**22.8%**	51	**30.5%**	362	**32.3%**
Marital status														
Married	148	**75.9%**	121	**66.5%**	135	**73.8%**	161	**81.3%**	171	**86.8%**	125	**74.9%**	861	**76.7%**
Other (not married, widowed, divorced, etc.)	47	**24.1%**	61	**33.5%**	48	**26.2%**	37	**18.7%**	26	**13.2%**	42	**25.1%**	261	**23.3%**
Presence of child														
Yes	144	**73.8%**	83	**45.4%**	111	**60.7%**	139	**70.2%**	151	**76.6%**	80	**47.9%**	708	**63.0%**
No	51	**26.2%**	100	**54.6%**	72	**39.3%**	59	**29.8%**	46	**23.4%**	87	**52.1%**	415	**37.0%**
Tenure														
Owns	142	**72.8%**	137	**74.9%**	128	**69.9%**	103	**52.0%**	118	**59.9%**	125	**74.9%**	753	**67.1%**
Rented/other	53	**27.2%**	46	**25.1%**	55	**30.1%**	95	**48.0%**	79	**40.1%**	42	**25.1%**	370	**32.9%**
Educational level														
Illiterate, literate, primary school	73	**37.6%**	59	**32.2%**	38	**20.8%**	119	**60.1%**	115	**58.4%**	8	**4.8%**	412	**36.7%**
Middle-, high school	86	**44.3%**	83	**45.4%**	67	**36.6%**	62	**31.3%**	64	**32.5%**	45	**26.9%**	407	**36.3%**
University or higher education	35	**18.0%**	41	**22.4%**	78	**42.6%**	17	**8.6%**	18	**9.1%**	114	**68.3%**	303	**27.0%**

* Differences in total n are due to missing values in each item.

Taking action

While 54% of the respondents had taken at least 3 of the 11 measures we asked about, 12% had not taken any measures. The low and moderate SEL groups in the high-risk district had taken more measures than the corresponding groups in the low-risk district. The high SEL groups in both districts had taken a similar level of measures and the high SEL group in the low-risk district had taken more measures than the low and moderate SEL groups in the high-risk district. Figure 6.2 displays the mean number of measures that had been taken according to SEL in the two districts.

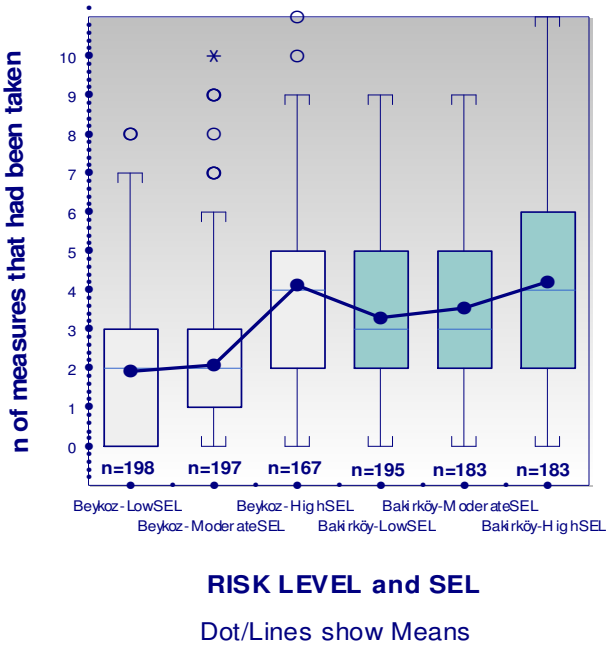

Figure 6.2 No. of measures that had been taken within SELs in each district

Table 6.2 shows details of the level of earthquake preparedness in the study area. The frequency of testing buildings for construction quality and obtaining earthquake insurance were significantly higher in the high-risk area (X^2: 296.6, p<0.001; X^2: 89.34, p<0.001).

Table 6.2 Frequency of the measures taken by the respondents in the districts and in total

Measures that had been taken	HRD / Bakırköy		LRD / Beykoz		Total	
	N	%	N	%	N	%
Have the building tested for construction quality	431	77%	144	26%	575	51%
Have torch near the bed	269	48%	277	49%	546	49%
Fix / Secure high furniture to wall (partly or all)	230	41%	213	38%	443	39%
Obtain earthquake insurance	287	51%	136	24%	423	38%
Have a family disaster plan	199	36%	163	29%	362	32%
Secure important documents	189	34%	147	26%	336	30%
Store food and water in view of an earthquake	133	24%	108	19%	241	22%
Have fire extinguisher	118	21%	122	22%	240	21%
Have an earthquake bag/kit	134	24%	87	16%	221	20%
Attend a relevant training	58	10%	70	13%	128	11%
Be a member/volunteer of a related NGO or CBO	15	3%	15	3%	30	3%

Determinants of taking action

Of the respondents, 14% could not mention spontaneously any of the nine measures that were listed in the questionnaire for the knowledge score and only 2% spontaneously mentioned all of them. The respondents were realistic in their judgement of risk in their district: 85% of the respondents living in the high-risk area thought that their district was

at high risk owing to geological conditions, and 80% of the respondents living in the lower-risk area thought that their district was at lower risk. However, only 14% of the respondents thought that they themselves or their families would definitely experience damage due to an eventual earthquake. Risk perception about family, self and home were similar in both districts: 70% of the respondents were more worried about other threats in their daily lives. Figure 6.3 displays the responses to some of the questions asked for assessing the attitude score.

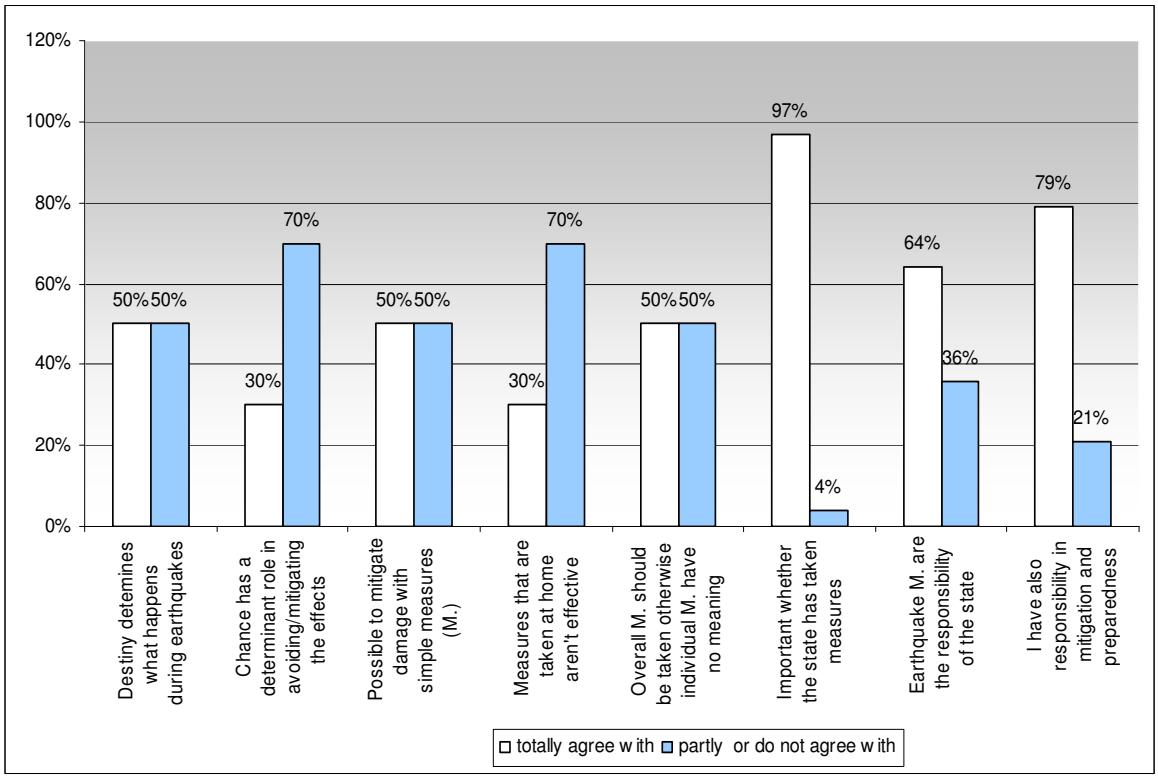

Figure 6.3 Frequency of responses to some of the attitude score questions

Of the respondents, 51% totally agreed with the statement that neighbours', friends' and relatives' behaviour regarding mitigation of damage and preparedness was a motivating example for them. Among those who claimed to be ready for an earthquake, 80% said

that they tried to persuade people around them to take similar measures. Negligence was the most frequently mentioned reason for not being ready by respondents in their own words (n: 256; 28%).

Table 6.3 displays the factors that were found to be significantly associated with taking action. Factors not found to be significantly associated with taking action in the univariate analysis were: marital status, a child at home and two types of earthquake experience (experience of only the phenomena and experience of damage, injury or loss within the close circle and family in previous earthquakes). Based on the findings of our qualitative study, we also looked for the association between having a child at home and having a family plan for earthquakes: families with a child at home had higher odds of having a family plan (OR: 1.5; CI: (1.2- 2.0); $p < 0.01$).

Table 6.3 Univariate analysis of the factors having significant association with taking action *(taking at least three mitigation and preparedness measures)* regarding the predicted earthquake

Variable	Value Labels	n and % of subjects who had taken action above average[1]		OR[2]	95% CI
District	High risk district (Bakırköy)	360	64%	2.4***	[1.9 – 3.0]
	Lower risk district (Beykoz)	242	43%	1	
SEL of sub-district	High SEL	257	73%	3.6***	[2.7 – 5.0]
	Moderate SEL	175	46%	1.1	[0.8 – 1.5]
	Low SEL	170	43%	1	
Self-expressed economic status	High	172	68%	3.4***	[2.1 – 5.5]
	Moderate	388	51%	1.7 *	[1.1 – 2.5]
	Low	40	38%	1	
Tenure	Owns	449	60%	2.1***	[1.6 – 2.7]
	Rents and others	153	41%	1	
Educational level	University or higher education	225	74%	6.7***	[4.8 – 9.3]
	Middle school / High School	252	62%	3.8***	[2.8 – 5.0]
	Illiterate/ can read & write/ primary school	124	30%	1	
Gender	Male	327	57%	1.3*	[1.04 – 1.7]
	Female	275	50%	1	
Age	16-34	110	46%	0.7*	[0.5 – 0.99]
	35-54	297	57%	1.2	[0.9 – 1.5]
	55<	195	54%	1	
Earthquake experience: (Participated solidarity or rescue activities during the past earthquakes)	Yes	140	67%	2.0***	[1.4 – 2.7]
	No	461	51%	1	
Earthquake knowledge score	Above average (2-3 point)	363	71%	3.8***	[3.0 – 5.0]
	Below average (0-1 point)	239	39%	1	
Risk perception score	4-6 (High risk perception)	204	58%	1.3*	[1.02 – 1.7]
	≤ 3 (Low risk perception)	397	52%	1	
Attitude score	Showed at least 7 action-stimulating attitudes towards action	350	62%	2.0***	[1.6 – 2.5]
	Less than 7	251	45%	1	
General safety action score	Often/Always used safety belt in car in the last month	481	63%	2.3***	[1.6 – 3.2]
	No such situation in the last month	49	27%	0.5**	[0.3 – 0.8]
	Never / Seldom used	72	42%	1	

[1] numbers and percentages are given within the group not in total.
[2] *** p <0.001; ** p <0.01; * p <0.05; Groups with OR 1 are referred to reference groups.

To explore which of the factors had the greatest influence on taking action, a multivariate logistic regression analysis was conducted. Self-expressed economic status was not significant in the multivariate analysis. We excluded this item from the models due to high correlation with SEL of the sub-districts (Table 6.4). Gender did not show a significant association in the final model and risk perception did not show a significant association at all. Being younger (16–34 years) was only of significance in the final model. The odds of taking action in this group were lower than in the reference group. The impact of factors such as location of the home, tenure, participating in solidarity and rescue activities after previous earthquakes and knowledge about earthquakes were extremely stable in the analysis, while others altered with the introduction of new factors into the models. The impact of the SEL of the district was changed with the entry of educational level into the model, and the impact of educational level was altered with the entry of knowledge about earthquakes into the model. The last two factors – attitudes towards action and general safety score – were also significant predictors.

Table 6.4 Multivariate logistic regression analysis of the factors predicting the likelihood of getting prepared for the earthquakes (taking at least three precautions)

		Model 1 Exp(B)	Model 2		Model 3	Model 4		Model 5	Model 6	Model 7	Model 8	Model 9
Location of the home	High risk area Bakırköy	2.4***	2.5***	2.3***	2.1***	2.1***	2.2***	2.4***	2.3***	2.3***	2.4***	2.3***
	Lower risk area Beykoz	1	1	1	1	1	1	1	1	1	1	1
SEL of the sub-district	High SEL		3.8***	3.7***	2.2***	2.0***	2.1***	2.0***	1.6*	1.6*	1.6*	1.6*
	Moderate SEL		1.2	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0
	Low SEL		1	1	1	1	1	1	1	1	1	1
Tenure	Owns			1.8***	1.9***	1.8***	1.8***	1.7***	1.8***	1.8***	1.8***	1.8***
	Rents and others			1	1	1	1	1	1	1	1	1
Educational level	University or higher education				4.7***	5.2***	4.9***	4.8***	3.5***	3.5***	3.2***	2.8***
	Middle School/ High School				3.3***	3.5***	3.4***	3.5***	3.0***	3.0***	2.8***	2.6***
	Illiterate/can read & write/primary school				1	1	1	1	1	1	1	1
Demographic characteristics	Age (16-34)					0.7	0.7	0.7	0.7	0.7	0.7	0.6*
	Age (35-54)					1.1	1.1	1.1	1.1	1.1	1.0	1.0
	Age (55<)					1	1	1	1	1	1	1
	Male						1.4*	1.3	1.4*	1.4*	1.4*	1.3
	Female						1	1	1	1	1	1
Direct experience (Participated in rescue & solidarity activities)	Yes							2.1***	2.0***	2.0***	2.1***	2.0***
	No							1	1	1	1	1
Earthquake knowledge score	2 or 3								2.1***	2.1***	2.0***	1.9***
	0 or 1								1	1	1	1
Risk perception score	4-6 - High risk perception									1.0	1.0	1.0
	≤3									1	1	1
Attitudes score	7-11 action-stimulating attitudes										1.6**	1.5**
	≤6										1	1
General safety score	Often/Always uses safety belt in car											1.5*
	No such situation in the last month											0.8
	Never /Seldom uses safety belt											1
Model summary of the final model: -2 Log likelihood 1226.490; R^2 0.326												
*** p<0.001; ** p<0.01; * p<0.05												

6.4 Discussion and conclusions

The differences in the sociodemographic features of the respondents in two districts are a reflection of the sociodemographic characteristics of the research site and are not systematically distributed in the study population. Therefore we do not think that they will affect the results. As an example, we think that the difference in the distribution of males and females in the two districts are mainly due to our involvement criteria, which led us to recruit heads of households. In Bakırköy more women said they were heads of household compared with Beykoz, probably because of the high level of education in Bakırköy and the higher percentage of older age groups in Bakırköy, which has an influence on the higher percentage of widowed women who automatically become head of the household.

Response rates differed slightly within SEL groups. This might slightly affect the average scores, but because of the high response rates in all the groups we do not think that it will change the results of comparisons.

Another issue is the collection of data about the measures that had been taken. We recorded the answers of the respondents about the measures they had taken but did not verify their responses with visual checks, which would have been the ideal way.

The univariate and multivariate analyses indicated that respondents' educational level was the leading factor associated with taking action. Educational level had a very high OR in the univariate analysis, but it was mainly influenced by the earthquake knowledge score and only slightly by age, the attitudes score and the general safety score in the multivariate analysis.

The earthquake knowledge score also appeared as a highly significant factor in the univariate analysis and a stable factor in the multivariate analysis. In the latter, the introduction of the earthquake knowledge score into the model is accompanied by a reduction in the effect of educational level on the odds of taking action, although this variable remains the leading factor. This finding is important for praxis, because it suggests that the level of preparedness might be improved by awareness programmes containing information about possible mitigation and preparedness measures. The findings of our qualitative study help us to comment on this issue more extensively. According to our study, knowledge about the risk and its consequences are not enough to make people take action; knowledge about how to cope with the risk is more crucial [(14)]. This was also the reason for getting spontaneous answers from respondents about possible mitigation and preparedness measures rather than letting them choose items from a list. It is, therefore, important that these programmes should communicate rather than disseminate the information, which was mentioned by Twigg (2007).

In the final model, the location of the home became the second leading factor associated with taking action. This factor was very stable when other factors were introduced into the models. In the high-risk area, the odds of taking action were higher than in the lower-risk area. It should be kept in mind, however, that lower risk does not mean no risk. When the unplanned settlements and *gecekondus* in some parts of Beykoz, as well as elsewhere in Istanbul, are considered, it becomes clearer that lower-risk areas should not be omitted from preparedness programmes.

Direct experience of an earthquake through participating in rescue or solidarity activities was the third leading factor associated with taking action. It was not at the top of the list

in the univariate analysis, but emerged in the multivariate analysis and was stable during the introduction of other factors into the models. We also discovered in our qualitative study that it was a strong facilitator for earthquake preparedness (Tekeli-Yeşil et al., in press). People with such experience could be mobilised to reach different groups in sub-districts or neighbourhoods. In addition, more than half of the respondents were influenced by their neighbours' and friends' behaviour regarding earthquake preparedness, and nearly all of those who claimed to be ready for an earthquake said that they had tried to persuade people around them to take similar measures. These findings about direct experience of earthquakes and interaction between individuals regarding taking action could be considered in future programmes, and motivated individuals and those who had already taken action could be given appropriate roles and some responsibility in reaching and educating other people.

Contrary to the existing literature, it appeared that experience of only the event (Lindell & Prater, 2000) and experience of material or human loss or injury in the close circle or family (Kalaça et al., 2007) did not show any association with taking action. Turkey is a land of earthquakes and the citizens of Istanbul experienced the latest devastating earthquakes in 1999. This might be a reason why experience with previous events has no association with taking action. Even though we expected an association between experience of loss due to previous earthquakes and taking action, this factor was found to have no significant effect. The low percentage of respondents who had experienced material or human loss or injury in the close circle or family might be an explanation for this result.

In our last model, home ownership appears as the fifth determinant after knowledge about earthquakes. In our qualitative study we saw that tenants regarded their situation as temporary and thought that any investment in a rented home was a waste of limited resources, plus the fact that in some cases, landowners restrict such activities as fixing high furniture to the walls, which they think would destroy the look of the property. This finding indicates that existing laws about ensuring the safety of rented homes should be improved and widely and clearly promulgated.

Socioeconomic level, with different measurement variables such as income or job, is one of the factors defined as a determinant in almost all of the literature (Asgary & Willis, 1997; Fişek et al., 2003; Palm, 1998). Even though the SEL of the sub-district showed a strong association in the univariate analysis, it showed only a moderate association in the presence of other factors, namely educational level and earthquake knowledge. Figure 6.2 clearly shows that the high SEL group is responsible for the difference between SEL groups in taking action. Considering the quality of the building structures in the areas where low SEL groups live, these groups should be also primarily concerned as well as those in geologically and tectonically high-risk areas.

Contrary to the findings of Fişek and colleagues (2003), our study showed a correlation between intention to act and actually taking action. This might be due to the use of a wider range of items in our questionnaire to assess the attitude score. In addition, our findings regarding the attitudes of respondents suggest that awareness programmes should also focus on changing individuals' attitudes, especially in terms of belief in the effectiveness of measures and the possibility of coping with earthquakes. McClure and colleagues suggested a strategy of educating citizens to recognise that damage in natural

disasters has more than one cause, and that some of the causal factors are relatively controllable (McClure, Walkey, & Allen, 1999).

The use of seatbelts while driving, which we took as an example of practice about general safety measures, was also a determining factor for taking action. In addition, negligence was the most frequently mentioned reason for not taking measures by respondents in their own words, and most respondents did not give priority to earthquakes among their other daily risks. These findings point to the discussion in our qualitative study about the culture of negligence in Turkish society and emphasize the importance of creating a culture of safety in the community instead.

Among demographic characteristics, gender and age were significant in the univariate analysis, but only age remained significant in the final model of multivariate analysis. The odds of taking action were lower among younger people than older, which might be due to the starter effect. Generally, young people do not yet have stable economic conditions.

Risk perception was not found to be a significant predictor of taking action in the multivariate analysis. However, we suggest further investigation into perception of risk for self and taking action.

Some factors, which were not significant predictors for taking action in general, might have an effect on individual measures, for example, having a family plan and having a child at home. Additional determinants for some measures could be considered in the awareness programmes.

In conclusion, regression analysis reveals that preparedness mainly depends on educational level, location of the home, participation in rescue and solidarity activities in past events, knowledge about earthquakes and home ownership, all factors that cannot easily be changed. Among these top associated factors, only the higher earthquake knowledge score seems to be amenable to intervention. Thus, efforts should be put into developing effective awareness programmes which help individuals to gain critical awareness of earthquakes. These programmes should also consider the characteristics of different sub-groups in society. According to our findings, educational and socioeconomic levels, tenure and age are the most important characteristics to consider. Disaster managers should, therefore, be aware of barriers and motivations peculiar to their communities. Motivated individuals, such as those who have participated in rescue and solidarity activities in past earthquakes, could be involved in these programmes to reach other people. Their involvement would not only help access in the community but also empower them.

Finally, based on our findings about the earthquake knowledge score, we suggest further investigation into the effectiveness of different types of awareness programme so as to work out the best ways of disseminating information regarding earthquake preparedness.

6.5 Acknowledgements

The authors thank Professor Sibel Kalaça for her valuable support in the conduct of this survey.

PART V

GENERAL CONCLUSION and DISCUSSIONS

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7. Discussion and conclusions

This thesis has investigated the process of taking action regarding mitigation and preparedness for an earthquake and its effects at individual level and the factors influencing this process. In addition, the level of preparedness at individual level in the study areas was also assessed.

This chapter contains an overall discussion of the methodology and the main findings with reference to the original objectives described in section 1.3 above, and puts forward some recommendations and needs for further research .

7.1 Methodological issues

The study is in two parts. In the first (qualitative) part we conducted 12 FGDs with individuals living in two districts of Istanbul: Bakırköy (higher-risk) and Beykoz (lower-risk) and 11 in-depth interviews with experts, authorities and key informants. In the second (quantitative) part of the study a field survey was carried out in the same districts. The study had the benefit of combining qualitative and quantitative methods. The first part of the study presented an in-depth response to the study questions and a better understanding about how people react to earthquakes and take action to protect themselves against them. The diversity and quality of the data in the qualitative part were enhanced by different information sources, namely residents and experts. The qualitative part also gave us the advantage of preparing a better survey instrument with its findings,

while the quantitative part allowed us to identify the factors predicting the taking of measures in anticipation of earthquakes and to generalize our findings.

The study supplied us with very rich data. Istanbul is a highly cosmopolitan city and each district has its own features. It was impossible to find matching districts in terms of demographic and socioeconomic features and with different levels of risk in the context of the predicted earthquake. The stratified study design did, however, allow us to have different SEL groups in both of the districts.

In order to investigate the process of taking action and to identify the factors influencing this process, we considered the whole process in the study design and thus could not go into great detail on any one theme, each of which deserves a separate investigation. This preference had the advantage of yielding an overview which made it possible to investigate the whole process and see the whole picture, but it had the disadvantage of not being able to go into detail about each theme.

7.2 The process of taking mitigation and preparedness action in anticipation of an earthquake and its effects at individual level

The conceptual framework concerning the process of taking action described in section 2.2 above was considered during collection and analysis of the data. The findings of the qualitative study showed how individuals proceed to action or where they drop out of the process. Generally, the process was interrupted by intervening factors after or within the awareness stage. Less commonly, it continued to a subsequent stage or stages, but was again interrupted before successful completion. Completion of the process was the least

common pattern among the group participants. The results confirmed that where there is a risk, the awareness stage is a prerequisite in this process, although usually the intervening personal, social and environmental factors determine whether the process will continue after this stage or not.

Awareness

In the qualitative part of the study it was seen that the participants had relatively good knowledge about the risk of an earthquake and its consequences but knew less about how they might adequately respond. The study of Fişek and colleagues (2003) showed similar results regarding knowledge about earthquake risk. Participants had a high risk perception for the city in general, which other studies have confirmed (IBB, 2002; Kalaça et al., 2007), but they did not think that they themselves were at risk (only 14% of the respondents thought that they themselves or their families would definitely experience the impacts of the predicted earthquake). The *awareness* stage was the point at which most people dropped out of the process. The findings indicate that awareness should not be considered solely as knowing about the risk or even perception of the risk: rather it is having knowledge about the risk, its consequences and how to cope with it altogether, as well as perceiving the risk not only in general but also personalizing it. The results of the multivariate logistic regression analysis are parallel with the qualitative findings. The earthquake knowledge score, which also comprises knowledge about how to cope with the risk, was a significant determinant of taking action (OR: 1.9, CI: [1.4, 2.6]), but the risk perception score, which assessed risk perception as a total, was not a significant factor in determining the taking of measures. In both parts of the study it was seen that

the *awareness* stage is crucial and is also the point where most of the individuals had problems staying with the process. We are therefore planning to make a further investigation with the data and try to find out in detail the determinants of awareness and the role of awareness in taking action.

Evaluation of costs and benefits

A full investigation of the *evaluation of costs and benefits* in terms of physical, psychological and economic costs of taking action requires some additional methods, for example preference-based methods. We could only gather some clues about this stage in the process.

In the qualitative part of the study, we have seen that among many daily needs it was difficult for the respondents to invest their limited time and money in or to give priority to earthquake preparedness measures. Participants usually made clear their preference for immediate needs and not for the probability that an earthquake would happen in 20–30 years.

Furthermore some of the participants mentioned that they could not bear the psychological cost of some measures, as they were a constant reminder of the threat.

Attitude and intention

In the FGDs it was seen that the creation of attitudes which stimulated intentions and finally action was not straightforward. Even so, being inclined to take action (showing at least seven action-stimulating attitudes) had a moderate association with actually taking

measures (OR: 1.5, CI: [1.2, 2.1]). Statements by the group participants and the survey results (Figure 6.3) call attention to outcome expectancy, helplessness and transferring responsibility to others. The respondents were right to emphasize macro- and structural measures, but this emphasis should not reduce the importance of micro-scale/individual and non-structural measures. The damage and other impacts from earthquakes have more than one cause, thus mitigation and preparedness measures are most effective when they are taken at all levels and for all causes. Furthermore, the studies mentioned in section 2.5 above indicate that individual measures and non-structural measures could also be very helpful in saving lives and properties. Awareness programmes should persuade individuals of the benefits of precautions taken at individual level and the effectiveness of non-structural measures, most of which cost little or nothing. When the strong belief in macro-measures among both focus group participants and interviewees is considered, it is clear that state institutions should set a good example to the public. If individuals see large-scale action taken at governmental level, they might be motivated to take measures of their own.

In the FGDs and in-depth interviews we have identified that helplessness is a hindrance to taking action among individuals and fatalism was rather a way of expressing this helplessness. In the quantitative part of the study, a relatively high percentage of respondents said that people experience the things that are written in their destiny during an earthquake and chance has a determining role in avoiding or mitigating the damage from an earthquake. However, when the findings of the qualitative part of the study are considered, this relatively high percentage could be interpreted as an expression of a coping mechanism. As a consequence of belief in the effectiveness of structural

measures, the low-income groups in particular thought that since they could not afford the cost of needed interventions they were completely helpless against earthquakes. Here again, the importance of persuading individuals about the effectiveness of all kinds of measure and hence the possibility of coping successfully with an earthquake and its effects comes up. Traumatisation and false perceptions of the damage (the impression that absolutely everything had been destroyed during the 1999 earthquakes, for example), which is mainly caused by scenes of collapsed buildings and battered people on television during the previous earthquakes, contributed to helplessness among individuals. This indicates the need for better collaboration between disaster management institutions and the media. The media should act with responsibility instead of thinking about the ratings. In earthquake-prone countries, such as Turkey, the media should also broadcast stories of successful preparedness or scenes of standing buildings in order to help individuals understand the causes of the damage or other impacts and realise that damage can be prevented or mitigated.

Transferral of responsibility to others (e.g. state, governmental, local authorities) in many areas was also discussed by Inelmen et al. (2004). This phenomenon was also seen in both parts of our study, although it led to a contradictory conclusion: on the one hand, individuals transferred responsibility to the state, but on the other they did not trust state institutions. This point might be discussed in view of *helplessness* and the *culture of negligence*. Individuals might perceive earthquakes as not controllable and manageable and consider they could not protect themselves, and hence transfer the responsibility to state institutions. Alternatively, simply saying the responsibility should be transferred to state institutions might act as an excuse for neglecting the risk of an earthquake occurring

among the other risks in daily life. The results showed that participants not only transferred responsibility to the state, but also took the state as an example to themselves.

Most of the respondents (79%) to the survey attributed responsibility to themselves as well as the state for mitigation and preparedness. This high percentage might be interpreted as saying what they thought was expected instead of telling the truth. An alternative explanation might be the effect of the 1999 earthquakes. In the qualitative part of the study, it was seen that the concept of mitigation and preparedness at all levels in anticipation of an earthquake came onto the agenda mainly after the earthquakes in 1999. The development of new attitudes (in our case, seeing oneself as also responsible) usually needs time and people might manifest both old and new attitudes in the transition phases.

Action

Level of preparedness at individual level in Bakırköy and Beykoz.

Figure 6.2 illustrates clearly the level of preparedness in both districts studied. On average, individuals had undertaken 3 out of 11 listed measures at their homes, but 12% of the respondents had not taken any measures at all. Individuals living in neighbourhoods known to be inhabited by high socioeconomic groups in the higher-risk district were the most prepared in the study population, while individuals living in neighbourhoods known to be inhabited by low socioeconomic groups in the lower-risk district were the least prepared. These findings parallel the findings of previous studies in Istanbul which were noted in detail in section 2.5 above (Fişek et al., 2003; IBB, 2002; Kalaça et al., 2007).

Data gathered from the quantitative part of the study showed the frequency of each measure taken by the respondents (Table 6.3). In our quantitative study, having the building tested for construction quality was the leading measure taken by respondents, followed by keeping a torch near the bed, fixing high furniture to the wall and obtaining earthquake insurance, respectively. These findings are slightly different to the findings of the studies mentioned in the previous paragraph. In those studies, learning how to behave during an earthquake was the leading measure taken, followed by keeping an earthquake bag/kit, fixing high furniture to the wall and getting earthquake insurance. We included learning how to behave during an earthquake among the questions in the earthquake knowledge score and did not take it as a measure, which should be the main reason for the difference, although the difference might have occurred due to the nature of cross-sectional studies. Studies in other countries showed that preparedness measures were more popular than mitigation measures (Lindell & Perry, 2000; Spittal et al., 2005). However, our findings showed the opposite if we exclude keeping a torch near the bed, which is a measure for use in multiple eventualities such as burglary or power failures as well as earthquakes. The relatively higher percentages of those who had had the building tested, fixed high furniture to the wall and obtained earthquake insurance should be discussed in many contexts. These three measures are all about the buildings. Two of them (having the building tested and fixing high furniture to the wall) are mitigation measures and earthquake insurance is a preparedness measure. This result might be interpreted as expecting a high level of structural damage either due to the magnitude of the predicted earthquake or due to the low structural quality of the existing buildings in Istanbul. Alternatively, if we consider that earthquake insurance has been obligatory

since the end of 1999 and think about it separately, the results might be interpreted as a stronger belief in the effectiveness of structural measures and acknowledging the importance of mitigation measures taken by the respondents. The latter interpretation is encouraging, because we know from public health that preventive measures are always superior to cure but less attractive. It is difficult to persuade individuals, even the professionals, to take preventive measures for all kinds of health problem. Individual belief in structural measures is a good base for disaster management, but we have to consider that prevention, mitigation and preparedness measures are a package and individuals are best prepared if they do not omit any of them.

7.3 Additional personal, social and environmental intervening factors that are associated with taking action to prepare for and mitigate the effects of the predicted earthquake

The process of taking action was interrupted at different stages by various personal, social, economic and environmental factors. In the qualitative part of the study we tried to identify and understand these factors and in the quantitative part we tried to find out which of them were most helpful in predicting the taking or not of action. In the light of the objectives of the study, discussion of these factors will begin with location of house (different levels of risk) and SELs, before continuing with other intervening factors.

7.3.1 Differences in taking action between residents of higher- and lower-risk districts and between groups with different SELs

Location of the house

Of the 561 respondents living in Bakırköy, 360 (64%) had taken at least three measures, while 242 (43%) of the 560 respondents living in Beykoz had also taken at least three measures. District was the second leading factor (OR: 2.3, CI: [1.6, 3.1]) in predicting the taking of measures in the multivariate logistic regression analysis and it remained very stable with the inclusion of other factors in the models. This result showed that the actual presence of the risk in the general context was well perceived by the respondents and stimulated them to take precautions. It is an advantage that the respondents considered the actual level of the risk in the districts, but lower risk does not mean no risk so the lower-risk areas should not be neglected. Moreover, each building and building site, regardless of whether it was in the higher- or lower-risk districts, had its own conditions, such as being built on an unstable river bank or being of low construction quality. This difference, and the importance of the individual conditions of the building and building site, should be explained clearly to the residents of Istanbul in the public awareness programmes.

Socioeconomic factors

SEL of the districts

Sub-districts were stratified according to the SEL present so as to assess the role of SEL in predicting the taking of measures. The findings of the quantitative study indicate that the odds of taking action among the respondents living in high SEL neighbourhoods are higher than among those living in low SEL neighbourhoods (OR: 1.6, CI: [1.1, 2.3]). In the final model, however, SEL was only in sixth position: the effect of neighbourhood SEL was altered mainly with the inclusion of educational level and the knowledge score. This finding is important for practical applications, because as seen in the qualitative part of the study economic conditions were often stated as a main hindrance for not taking measures among the participants of the FGDs as well as among some of the professionals. We have seen in the quantitative part of the study that this argument is true to some extent, but it is not one of the main factors. The importance of the knowledge score emerged here again, leading us to emphasize awareness programmes once more.

Educational level

Both parts of the study indicated the importance of educational level in taking action. In the focus groups it was seen that educated people were better informed about the risk and how to cope with it. Even within the low SEL groups, individuals with more education were better informed and prepared than the others. The quantitative part of the study also clearly indicated that educational level is the leading factor associated with taking action. The likelihood of taking action among respondents with university or higher education

(OR: 2.8, CI: [1.9, 3.7]) and respondents with a middle- or high-school diploma (OR: 2.6, CI: [1.8, 4.4]) was higher than in the reference group (illiterate, literate, primary-school diploma). Possible explanations for this finding might be problems in accessing information sources and/or provision of inappropriate information, which could lead to difficulties in understanding the information supplied among those with lower levels of education. The results show that the reference group is one of the groups that needs to be prioritized in disaster preparedness programmes and indicate the importance of developing appropriate programmes for these groups.

Tenure

In the qualitative part of the study, tenure (home ownership) featured in the discussions and was also reported in the working paper as a factor associated with taking action. Its importance was mainly revealed in the quantitative part of the study. This shows again the advantage of using mixed methods. The odds of taking action among respondents who owned their homes were higher than among tenants (OR: 1.8, CI: [1.3, 2.4]). The qualitative part of the study revealed that measures related to the building, such as retrofitting it, fixing high furniture to the wall and obtaining earthquake insurance were rare among tenants. Forty-two per cent of housing units in Istanbul are not owned by the occupants (TUIK, 2009b), so this group must also be given priority in disaster management programmes. Existing laws about ensuring the safety of rented homes should be improved and should be promulgated clearly within awareness programmes, so that tenants could force their landlords to take the required measures.

7.3.2 Personal factors

Contrary to the previous studies, among the demographic factors (Lindell & Whitney, 2000) marital status and presence of a child in the home were not found to be significantly associated with taking action. Our sample was mainly composed of married individuals with a child at home, which is characteristic of the population[17] and might explain the varied results. However, as in the example of the association between having a family plan and a child in the home, these factors might have associations with particular measures.

Gender and age

Gender did not feature in the discussions either during the focus groups or the in-depth interviews. In the univariate analysis, it was weakly significant but lost significance with the inclusion of other factors in the models. In the literature, gender was mainly associated with risk perception rather than with taking action (Fişek et al., 2003).

Neither did age emerge as a factor associated with taking action in the qualitative part of the study, even though the FGDs encompassed diverse age and gender groups. In the quantitative part, the odds of taking action in the younger age group were less than in the older group (OR: 0.6; CI: [0.4, 0.99]). However, the results showed a weak association and the CI is very close to 1.

[17] See DIE, 2002 for the results of the population census.

Experience

We asked three questions about the types of respondents' earthquake experience: experience of the earthquake tremor only; experience of damage, injury or loss within the close circle and family due to an earthquake; and participation in rescue or solidarity activities after the previous earthquakes. The first two kind of experience did not show significant associations in the analysis, contrary to the findings of a national study (Kalaça et al., 2007). The difference might be either due to using a different dependent variable (Kalaça and her colleagues took the number of measures that had been taken, whereas we used the taking of at least three measures or not as a dependent variable) or the low percentage of respondents who had experienced material or human loss or injury in the close circle.

The third type of experience, participation in rescue and solidarity activities during the previous earthquakes, appeared to be an important factor both in the qualitative and the quantitative parts of the study. In the FGDs, participants who had had such experience were the ones who demonstrated the highest level of preparedness and were most motivated to take action. In the multivariate logistic regression analysis, having direct experience through participating in rescue and solidarity activities during the previous earthquakes was the third factor associated with taking action (OR: 2.0; CI [1.4, 2.6]) and remained very stable when other factors were included in the models. We suggest that such individuals should be involved in awareness programmes and given appropriate responsibilities. They are motivated to help the professionals reach the people in their neighbourhoods and they are living examples of neighbours who have witnessed the impact of an earthquake directly and realize the importance of earthquake mitigation and

preparedness. Such an intervention could also help to empower the community and thus diminish the effects of both helplessness and transferring responsibility to the authorities.

7.3.3 Social factors

Social interaction

Lindell & Perry (2000) mentioned that mitigation of the impact of a hazard and preparedness for such an eventuality takes place in a social context. Similarly, our study showed that real examples are more persuasive than any given information. Furthermore, it is easier to spread the desired attitudes through social networks. Women, *muhtars* and people with direct experiences of an earthquake appeared as eventual key persons for future awareness programmes.

Culture of negligence

As discussed by Wisner and colleagues (2004) and Canon (2006), earthquakes are not at the top of people's priority lists. The normal risks of daily life, such as losing a job, illness or other risks in city life (traffic accidents, crime, etc.) take precedence.

However, as discussed previously, ignorance of general safety measures and even of these prioritised risks, which we called negligence, is very common both in the population generally (TAM, 1999; TUIK, 2009) and in institutions. Our research showed that there is an association between practices regarding general safety measures and taking action. Any success in creating a culture of safety in society instead of a culture of negligence would benefit the fight against all kinds of risk. Safety in daily life could be

integrated into the curriculum of schools, for example. Workplaces and state institutions should give an example to the community by taking appropriate measures: when individuals see this happening around them, they could also feel obliged to take action.

Lack of trust

Lack of trust in the building sector and the institutions that plan, apply and control building processes and retrofitting projects, appeared to be an important factor in the FGDs. In some workplace safety studies, trust has been discussed within the safety culture (Burns, Mearns, & McGeorge, 2006; Conchie, Donald, & Taylor, 2006). This argument is also applicable to our case; as well as individuals, institutions and authorities are also negligent in obeying general safety measures. Additionally, the common beliefs that people in the building sector have an extreme interest in profit and that corruption is widespread in this sector (Green, 2008) also play a role in this lack of trust. If there is to be any progress in hazard preparedness, the state institutions should take this issue seriously and get good control of the building sector. We did not investigate this issue in the quantitative part of our study due to the inappropriateness of the political atmosphere caused by national elections at the time of the survey.

7.3.4 Environmental factors

Earthquakes are difficult to predict and happen suddenly. Measures should, therefore, be taken continuously, but this, according to one of the in-depth interviews, is a troublesome task. Because of the relatively infrequent occurrence of destructive earthquakes and

normalisation of life in between, people are less concerned about them or give priority to other emerging needs. When people have limited resources, they do not want to invest them in an event which cannot be predicted and in any case may not affect them. Low levels of planning for the future generally in society (Inelmen et al., 2004) also contribute to unwillingness to make investments for an event that can be only be poorly predicted. Not much can be done about the environmental factors, but improvements among the other intervening factors would also reduce the effect of environmental factors. A practical recommendation regarding environmental factors is to keep the public permanently aware of the danger of an earthquake.

7.4 Recommendations

Several recommendations have been mentioned throughout this thesis. For the sake of clarity, they are summarised below.

1. Our findings showed that educational level, location of the home, direct experience of an earthquake through participating in rescue and solidarity activities during past events, knowledge about earthquakes, and tenure of the home are the leading factors associated with taking action to mitigate the damage from and to be prepared for the hazard. These factors are not easy to change: interventions would be needed in the political, social and economic systems of the country. Knowledge about earthquakes can, however, be improved through simpler interventions such as countrywide, effective awareness programmes. Every effort should, therefore, be put into the effective provision of information about earthquakes to the public.

2. Awareness programmes should focus on supplying information about how to cope with earthquakes and how to personalise the risk.

3. Priority should be given in such programmes to people with lower educational levels, those living both in higher- and lower-risk areas and in low socioeconomic districts, tenants and young people.

4. People who had participated in rescue and solidarity activities could be given duties and responsibilities in such programmes to reach the community and local people. Women and *muhtars* should also be engaged to reach some local groups.

5. Awareness programmes should include activities targeting at changing attitudes through real and persuasive examples. The starting point in this change should be people's beliefs and attitudes about the effectiveness of measures, towards those involved in disaster management, and about their own role and capabilities. To achieve this goal, communication experts should be involved in disaster management teams and close collaboration established with the media.

6. State institutions should play an exemplary role in taking precautions.

7. Safety in daily life should be integrated into school curricula with the aim of overcoming the culture of negligence in society. As well as schools, state institutions and workplaces could be also involved in a nationwide campaign.

7.5 Identified research needs

The previous section highlights the importance of effective awareness programmes. We suggest further research about the components of awareness to identify in detail the determinants of awareness and its role in taking action. This could be done with further analysis of our data set.

An evaluation of the effectiveness of methods used in awareness programmes with an experimental design would be of benefit in enhancing future programmes. It could also help to identify and develop appropriate risk communication strategies.

The evaluation of costs and benefits stage in our framework also needs some further research in order to understand the determinants of this evaluation process.

The two issues of the culture of negligence and lack of trust also need further investigation. A multidisciplinary research team including a social scientist would be appropriate for such research.

The identification of predictors for taking each measure independently might reveal some additional factors particular to these measures. This could also be performed with our data set.

Finally, methodological research about the appropriateness in disaster research of using items with objective or subjective assessments from the respondents, which could also be conducted with our data set, could help scientists in future research.

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9. Appendices

Appendix 1: In-depth Interviews question guideline in Turkish

Çalışmanın adı: İstanbul'da yaşanabilecek bir deprem için kişisel düzeyde zarar azaltma, önlem alma ve hazırlıklı olma sürecini etkileyen faktörler

Araştırmacı: Sıdıka Tekeli Yeşil

Derinlemesine Mülakatlar Konu Rehberi:

Giriş konuşması, sözlü katılım onayı ve ses kayıdı yapmak için katılımcıdan izin alınması.

Isınma:

1) Türkiye (toplum, bireyler) Marmara depreminden gereken dersleri aldı mı? Hayırsa neden?

Sorular:

2) İstanbul halkı sizce depreme hazırlanıyor mu? Hazırlık için bireysel düzeyde neler yapıyorlar?
3) Sizin ve kurumunuzun deneyimlerine göre kişileri depreme yönelik zarar azaltma, önlemler alma ve hazırlıklı olma konusunda motive eden ya da engelleyen faktörler nelerdir?

Derinleş:

Ek sorular sormak gerekirse aşağıdaki veya başka soruları kullanarak derinleş:

Toplumun / Istanbul halkının depremle ilgili bilgi düzeyi hakkında ne düşünüyorsunuz?

Istanbul halkı var olan riski algılıyor mu?

Bireysel riskleri hakkında ne düşünüyorlar? Bu önlem almayı nasıl etkiliyor.

Sosyo ekonomik düzey (yoksulluk / zenginlik) nasıl etkiliyor?

Depremin zamanının noktasal olarak belirlenememesi ya da beklenen büyüklüğü gibi nedenler etkiliyor mu?

Maliyet – Fayda (gerekirse, önerideki kurumsal çerçeveyi açıkla) değerlendirmeleri önlem almada ne kadar etken?

Sosyal çevre ve toplumsal destek kişilerin hazırlıklarını nasıl etkiliyor?

Devletin bu konuda yaptığı çalışmalar toplumu nasıl etkiliyor?

Toplumun bu konuda devletten, belediyelerden ya da resmi kurumlardan beklentileri neler?

Din / İnanç, kadercilik etken mi? Ne kadar etken?

4) Depreme yönelik önlem alma ve deprem hazırlığı ile ilgili yaptığınız çalışmalara (ya da yapılan çalışmalara) kimler katılıyor ya da başvuruyor? Başvuran insanların genel profili nedir?
5) Nasıl bir süreçten sonra size başvuruyorlar? (ör: arkadaştan duyup, gazeteden okuyup, biz ulaşıyoruz vs.)
6) Hedef kitlenizi düşünürsek, çalışmalarınızın insanlara ulaşmasında ne tür sorunlar yaşıyorsunuz?

7) Bu sorunları aşmak için sizin kişisel önerileriniz neler?

8) Sizce deprem konusunda insanları harekete geçirmek için ne yapmak lazım?

9) Topluma ve insanlara ulaşmak için en etkin yöntemler neler sizce?

Derinleş:

Medyanın etkisi nasil?

Bilim adamları

Sivil toplum örgütleri

Devlet kurumları

Teşekkürler.

Appendix 2: In-depth Interviews question guideline in English

Name of the study: Factors affecting the process of taking action at individual level regarding mitigation and preparedness for an earthquake in Istanbul.

Investigator: Sıdıka Tekeli Yeşil

In-depth interview question guide:

Introduction, ask for informed consents and get permission for tape recording

Warming up:

1) What lessons did Turkey (the public and individuals) learn from the 1999 earthquakes?

Questions:

2) Are the residents of İstanbul getting prepared for the predicted earthquake? What are they doing to prepare?
3) Depending on your or your institution's experiences, what are the factors that motivate or impede individuals regarding taking mitigation measures or getting prepared?

Explore:

If there is a need to deepen the topic, further questions are:

What do you think about the level of knowledge of the residents of Istanbul regarding earthquakes?

Do they perceive the risk?

What do they think about their individual risk? And how does this affect taking precautions?

How does socioeconomic level (poverty/wealth) play a role in taking precautions?

Does the poor predictability of earthquakes or expected magnitudes of the predicted earthquake have an effect on taking precautions?

How does the evaluation of the costs and benefits *(if needed, explain briefly the conceptual framework)* of taking measures affect taking precautions?

What is the role of the social environment or social support in individual preparedness?

What is the role of the state in individual preparedness?

What does the public expect from the state, local government or authorities regarding preparedness?

Do religion/belief and fatalism play roles? If yes, to what extent?

4) Who are participating in or want to participate in your programmes about earthquake preparedness? What are the general characteristics of the people participating in such programmes?
5) How do these people get in touch with you (for example, after hearing from a friend or reading about your programme in a newspaper) or do you look for people?

6) If you think about your target population, what are the problems about getting attention or reaching people?
7) Do you have any suggestions as to how to overcome these problems?
8) What are your suggestions for motivating people to take action regarding earthquakes?
9) What are the effective ways to reach to individuals and the public?

Explore:

The role of the media/scientists/nongovernmental or civil society organizations /state institutions

Thank you.

Appendix 3: FGDs question guideline in Turkish

Çalışmanın adı: İstanbul'da yaşanabilecek bir deprem için kişisel düzeyde zarar azaltma, önlem alma ve hazırlıklı olma sürecini etkileyen faktörler

Araştırmacı: Sıdıka Tekeli Yeşil

Odak Grup Görüşmeleri Konu Rehberi:

Giriş konuşması, sözlü katılım onayı ve ses kayıdı yapmak için katılımcılardan izin alınması. Tanışma

Risk Farkındalığı ve Risk Algılaması / Risk Awareness and Risk Perception

1) İstanbul'u etkileyebilecek bir Marmara depremi olasılığı hakkında neler düşünüyorsunuz? Böyle bir olasılığa inanıyor musunuz?
2) Bu beklenen deprem İstanbul'da ne tür sonuçlara yol açacak, deprem sonrasında günlük yaşamda, sosyal alanda, fiziksel çevrede, ekonomide neler olacak, neler yaşanacak?

Derinleş:

Ölüm ve yaralanmalar

Binaların yıkımı

Normal yaşamın felce uğraması

İşsizlik

Deprem sonrası barınma, beslenme gibi yaşamsal sorunlar

3) Bu sonuçlardan sizlerin, yakın çevrenizin ve ailenizin etkileneceğini, zarar göreceğini düşünüyor musunuz ya da bir kısmının kendi başınıza gelip gelmeyeceği konusunda ne düşünüyorsunuz?

4) Depremin ..... ve ..... etkilerinden / sonuçlarından bahsettiniz (*Ya da alternatif olarak;* Depremin bir çok etkisinden bahsettiniz). Sizce bu etkileri/sonuçları hafifletmek ya da önlemek mümkün müdür?

   Eğer mümkün olduğunu düşünüyorsanız bu etkileri/sonuçları hafifletmek ya da önlemek için bireyler ve aileler neler yapabilir? Neler yapmalilar, bunlardan bahseder misiniz?

   Ya da eğer hafifletmenin mümkün olmadığını düşünüyorsanız neden böyle düşündüğünüzü bize anlatabilir misiniz?

   Derinleş:

   Binanın yapısal kontrolü ve güçlendirilmesi

   Ev içinde alınan yapısal olmayan önlemler (ör: mobilyaların sabitlenmesi)

   Deprem çantası

   Aile deprem planı

   Deprem sigortası

   Bilgilenmek (ör: Deprem sırasında / sonrasında yapılması gerekenleri öğrenmek)

5) Bu konuştuğumuz önlemlerden en çok ve en az etkili olduğunu düşündüklerinizi nedenleriyle birlikte söyleyebilir misiniz?

Maliyet / Fayda değerlendirmesi (Evaluation of Cost and Benefits), Tavır ve Tutum (Attitude and Intention)

6) Biraz önceki konuşmamızda, alınan önlemler arasında, en sık bahsedilen önlemler ....., oldu. Neden öncelikle bu önlemleri aldınız ya da neden en çok bu önlemler konuşuluyor biraz daha açıklar mısınız? *(Eğer soru anlaşılmaz ya da istenen cevap gelmez ise şu şekilde tekrar sor)* ..... ve ..... önlemlerden de bahsetmiştiniz, bu önlemleri neden almadınız?

Derinleş:

Para / Pahalı / Öncelikli başka ihtiyaçlarım var.

Zaman yok

Kolay / Zor

Etkisine inanç / işe yarayıp yaramaması

Huzursuz ediyor

Hayatı, günlük yaşamı zorlaştırıyor

Allah'ın dediği olur / kader

Not1**:** Eger kader / Allah'ın dediği olur tarzında söylem olursa; Bazılarınız kaderden bahsetti ama yine de aldığınız ya da alınması gereken önlemlerden de bahsetti. Eğer kaderin /Allah'ın dedigi olacak diye düşünüyorsanız bu önlemleri almaya neden ihtiyaç duydunuz?

(Varsa çelişkiyi aydınlatmaya çalış).

(Eğer 6. sorunun tartışması açık olmazsa ya da tatmin etmezse, şu şekilde tekrar sor): Bildiginiz ya da duydugunuz bir önlem hakkında o önlemi alıp almamaya neye göre karar veriyorsunuz?

7) Devletin bu önlemleri almanızdaki, yani kişilerin önlem alması konusundaki etkisi, rolü ve sorumluluğu konusunda neler düşünüyorsunuz?

   Derinleş:

   Devletten beklenti deprem öncesine mi yönelik yoksa deprem sonrasına mı?

   Örnek olmalı

   Bilgilendirmeli

   Denetlemeli

   Bireylerin önlem almasında sorumluluğun ne kadarı devletin ne kadarı sizlerin / bireylerin?

8) Bahsettiğiniz önlemlerden yakın zamanda veya ileride almayı / uygulamayı düşündügünüz önlemler var mı? Hangileri?
9) Kredi, danışmanlık vs. gibi destekler olsa bu önlemlerle ilgili tutumunuz nasıl olur?
10) Depreme hazırlıkla ilgili olarak gönüllü gruplara katılma konusunda neler düşünüyorsunuz?

Diğer faktörler Intervening factors:

11) Depremin zaman zaman unutulması, gündemden çıkması depreme karşı önlem almanızı ya da hazırlık yapmanızı nasıl etkiliyor?

12) Çevreniz, eşiniz akrabalarınız, arkadaşlarınız, komşularınız sizleri bu önlemlerin alınması ile ilgili nasıl etkiliyor?

Derinleş:

Örnek verebilir misiniz?

13) Depreme yönelik aldığınız önlemlerle ilgili sizin veya tanıdıklarınızın yaşadığı olumlu ya da olumsuz deneyimlerden bahseder misiniz?

14) Son olarak sormak istiyorum, sizce deprem konusunda insanları harekete geçirmek için ne yapmak lazım?

Appendix 4: FGDs question guideline in English

Name of the study: Factors affecting the process of taking action at individual level regarding mitigation and preparedness for an earthquake in Istanbul.

Investigator: Sıdıka Tekeli Yeşil

Focus group discussions question guide:

Introduction and welcome. Ask for informed consents and get permission for tape recording. Each participant (including the moderator and the observer) to introduce themselves to the group.

Risk awareness and risk perception

1) Do you think it is probable that Istanbul could be affected by an earthquake in the near future?
2) What kind of consequences would such an earthquake have in Istanbul? What would happen in daily, social and economic life and the physical environment after such an earthquake?

Explore:

Deaths and injuries

Collapse of buildings

Interruption of normal life

Unemployment

Shelter, nutrition

3) Do you think that you, your family or your close circle will be affected by these consequences? Do you think that you will also experience these or some of these consequences?

4) You have mentioned x and x consequences of a predicted earthquake (*alternatively:* you have mentioned many consequences of a predicted earthquake). What do you think about the possibility of mitigating or preventing these consequences? *(For participants, who think that it is possible)* What can individuals or families do to mitigate or prevent these consequences? *(For participants, who think that it is not possible)* Could you tell us why you think in this way?

Explore:

Structural evaluation of the building and retrofitting

Non-structural mitigation measures (for example, securing high furniture)

Earthquake/emergency kit

Family plan

Earthquake insurance

Being informed (for example what to do before, during and after an earthquake)

5) Could you tell us which of these measures are the most and which are the least effective? Why do you think so?

Evaluation of cost and benefits, attitude and intention

6) During our discussion, X and X were mentioned as the measures most frequently taken. Why have you taken these measures, or why were they mentioned most frequently? *(If the question is not understood or you cannot get an adequate response, ask again in the following format)* You mentioned the measures Y and Y. Why have you not taken these measures?

Explore:

Economic resources/expense/other emerging needs

Time

Easy/difficult

Belief in effectiveness

Psychologically disturbing

Makes daily life difficult

God or fate determines what will happen.

Note 1. If there were statements about both fatalism and eventual measures. Some of you mentioned that God or fate determines what will happen, but also mentioned some measures that you have taken. If you think that it is God who determines what will happen during an earthquake, why have you taken these measures or why do you want to take some measures? *(If there is a contradiction, try to explore it).*

(If the overall response to question 6 is not satisfactory, ask again in other forms, for example: How do you decide to take or not to take a measure that you have heard or learned about?

7) What do you consider is the role of the state as regards taking precautions at your homes? What is the responsibility of the state?

Explore:

Is the perceived role of the state mainly for the pre-disaster or post disaster stages?

It plays an exemplary role

Information source

Control

Share of responsibility between the state and individuals

8) Are you planning to take any of the aforementioned measures in future? Which ones?
9) How would you react if a credit or consultancy support was available to you?
10) What do think about participating in voluntary organizations regarding earthquakes?

Additional intervening factors:

11) Earthquakes are sometimes not on the public's agenda. How does this affect you in taking precautions?

12) How do your social environment, your spouse, relatives, friends or neighbours affect you in taking precautions?

Explore:

Can you give an example?

13) Can you tell us about your or your acquaintances' positive or negative experiences regarding taking earthquake measures at home?

14) What should be done to motivate people to take action regarding earthquakes?

Appendix 5: Questionnaire in Turkish

İstanbul'da yaşanabilecek bir deprem için kişisel düzeyde zarar azaltma, önlemler alma ve hazırlıklı olma sürecini etkileyen faktörler

Araştırmacı: Sıdıka Tekeli Yeşil

Haziran –Temmuz 2007

Anket Formu		
İlk dört soru görüşmeci tarafından doldurulacak!		
1. Tarih		
2. Anketör		
2a. Denetçi		
3. Yanıtlayan – eğer kendisi değil ise (hastalık, dil vs. nedenler ile) sadece yakınlık derecesi yazılacak hiç bir şekilde isim yazılmayacak		
4. İlçe:		
Mahalle:		
Sk:		
Küme no:		
Demografik / Sosyo-ekonomik veriler		
5. Cinsiyet	**1**	**E**
	2	**K**
6. Yaş		
7. Medeni hali	**1**	**Evli**
	2	**Bekar**
	3	**Dul (Eşi vefat etmiş)**
	4	**Birlikte yaşıyor**
8. Evde yaşayan çocuk sayısı		
9. Eğitim düzeyiniz	**1**	**Okur yazar değil**
	2	**Okur yazar**
	3	**İlkokul mezunu**
	4	**Ortaokul mezunu**
	5	**Lise mezunu**
	6	**Yüksekokul / üniversite ve üstü**

10. Size gore ailenizin ekonomik durumu nasıldır?	1	İyi
	2	Orta
	3	Kötü
11. Evin mülkiyeti kime ait?	**1**	**Kendisinin**
	2	**Kira**
	3	**Lojman**
	4	**Bir yakının ya da akrabanın ama kira ödemiyor.**
	5	**Diğer (Belirtiniz)**
12. Daha önce deprem yaşadınız mı?	0	Hayır
	1	Evet
13. Daha önce bir depremde siz veya ailenizden biri yaralandı mı ?	**0**	**Hayır**
	1	**Evet**
14. Daha önceki depremlerde herhangi bir yardım çalışmasına katıldınıy mı? Örneğin enkazdan insan çıkarma, depremzedelere yardım ve destek çalışması gibi	0	Hayır
	1	Evet
Bilgi		
15. Depremin sebebi nedir? **Size okuyacağım seçeneklerden bir ya da bir kaçını seçebilirsiniz.** ***(Seçenekler okunacak!)***	**1**	**Tektonik tabakalarda ve fay hattlarındaki hareketlerden kırılmalaradan kaynaklanır.**
	2	**Tanrının hikmetiyle olur.**
	3	**Güneş tutulması depreme neden olur.**
	4	**Ay tutulması depreme neden olur.**
	5	**Yer kabuğunun derin katmanlarındaki hareketler neden olur.**
	6	**Diğer (belirtiniz)**
16. Sizce deprem zararlarını azaltmak için neler yapılabilir? *(Seçenekler hiç okunmayacak, kişinin verdiği cevaba uygun bir seçenek işaretlenecek!)*	1	Yer seçiminde uygun zemin gözetilmeli / zemin etüdü yaptırılmalı
	2	Mevzuata / deprem yönetmeliğine uygun, sağlam, dayanıklı bina yapılmalı
	3	Mevcut binalarda zemin etüdü dayanıklılık araştırılıp iyileştirme yapılmalı
	4	Deprem sigortası yaptırılmalı
	5	Aile deprem planı yaptırılmalı
	6	Deprem çantası hazırlanmalı
	7	Yangın sçndürücü bulundurulmalı ve nasıl kullanılacağı öğrenilmeli
	8	Tehlikeli ve yüksek eşyalar sabitlenmeli
	9	Deprem esnasında ve sonrasında nasıl davranılacağı öğrenilmeli
	10	Bilmiyorum
	11	Diğer (belirtiniz)

17. Sizce deprem anında ne yapmak lazım? Size okuyacağım seçeneklerden bir ya da bir kaçını seçebilirsiniz. ***(Seçenekler okunacak!)***	**1**	**Sağlam bir eşyanın yanına veya altına çömelip başı ve enseyi koruyarak tutunmalı**
	2	**Hemen merdivenden ya da asansörden dışarı çıkmalı**
	3	**Kapı altına sığınmalı**
	4	**Diğer (belirtiniz)**
	5	**Ne yapılacağını bilmiyorum**
18. Sizce 1999 depreminden sonar Izmit ilindeki yamyassı olmuş (tamamen yıkılmış) bina yüzdesi ne kadardır, aşağıda okuyacağım seçeneklerden arasından bir tahminde bulunun? *(Seçenekler okunacak!)*	1	% 5
	2	% 15
	3	% 20
	4	% 35
19. Depreme dair yapılması gerekenlerle ilgili bilgiyi nereden aldınız? Aşağıda okuyacağım seçeneklerden bir ya da bir kaçına seçebilirsiniz. ***(Seçenekler okunacak!)***	**1**	**Televizyon programlarından**
	2	**Gazete / Dergilerden**
	3	**Internetten**
	4	**Arkadaşlardan / Komşulardan / Akrabalardan**
	5	**Okul / Mahalle / İşyerindeki etkinliklerden**
	6	**Resmi kurum ve kuruluşlardan**
	7	**Sivil tolum kuruluşlarından**
	8	**Diğer (belirtiniz)**
	9	**Hiç böyle bir bilgi almadım**

Risk algılaması / Tutum

20 – 36 sorular

Size bazı ifadeler okuyacağım, okuduğum cümleler için tamamen katılıyorum, yarı yarıya katılıyorum ya da kesinlikle katılmıyorum seçeneklerinden sadece bir tanesini seçerek cevap veriniz.

	Tamamen katılıyorum	Yarı yarıya katılıyorum	Kesinlikle katılmıyorum
20. Oturduğum ilçe deprem açısından başka ilçelere kıyasla az risklidir.			
21. Başka yerlerle karşılaştırıldığında bizim mahallede deprem riski daha az.			
22. Deprem olursa ben veya ailem zarar görür.			
23. Depremde bana birşey olmaz.			

24. Evimin depreme dayanıklı olduğunu düşünüyorum.			
25. Depremde insan kaderinde ne varsa, alnında ne yazılıysa onu yaşar.			
26. Depremin zaralarından kurtulmak ya da depremi hafif zararlarla atlatmak şansa bağlıdır.			
27. Depremin zararlarından basit önlemlerle korunmak mümkündür.			
28. Bence evin içinde depreme karşı alınacak önlemler pek etkili değildir.			
29. Toplum genelinde gerekli önlemler alınmadan benim birey olarak önlem almamın bir önemi, bana bir faydası yoktur.			
30. Devletin deprem konusunda hazırlık yapıp yapmadığı benim için önemlidir.			
31. Deprem öncesi ve sonrası alınacak önlemler devletin görevidir.			
32. Komşularımın, arkadaşlarımın veya akrabalarımın deprem önlemleri konusundaki davranışları bana örnek olur.			
33. Günlük yaşamda depremden daha çok kaygılandığım tehlikeler var.			
34. İstanbul çevresinde olması beklenen depremi bir süre sonra unutacağımızı düşünüyorum..			
35. Türkiye depremden ders aldı.			
36. Olası depremin zararlarını azaltmada bana da sorumluluklar düşüyor.			

Davranış		
Şimdi size hazırlıkla ilgili bazı sorular soracağım. Bu bölümde tekrar normal sorulara geçiyoruz.		
37. Depreme hazır mısınız, hazırlık yaptınız mı?	**1**	**Evet**
	2	**Kısmen**
	3	**Hayır**
37.soru evet ise 39.soruya geçin, hayır ya da kısmen ise 38. soruyla devam edin.		
38. Neden hazır değilsiniz ya da tam hazır değilsiniz? *(Seçenekler hiç okunmayacak, kişinin verdiği cevaba uygun bir seçenek işaretlenecek!)*	1	Komşularla anlaşamadım.
	2	Evim sağlam.
	3	Kiradayım.
	4	Arkadaş, akraba vs.den kimse birşey yapmıyor.
	5	Devlet birşey yapmıyor.
	6	Semt ya da ev değiştireceğim.
	7	Param / ekonomik gücüm yok.
	8	Zamanım yok.
	9	Tedbir almak çok pahalı.
	10	İhmalkarlık.
	11	Çevremde nasıl önlem alınacağını gördüğüm bir örnek yok.
	12	Birşey olmaz.
	13	Diğer (belirtiniz).
39. soru sadece 37. soruya evet cevabı verenlere sorulacak.		
39. Deprem ile ilgili aldığınız önlemleri çevrenizdekilere ve sevdiklerinize de aldırtmaya çalıştığınız oldu mu?	**0**	**Hayır**
	1	**Evet**
Yapısal önlemler		
40. Evinizin / binanızın yapı durumunu incelettiniz mi ya da incelendi mi?	1	Hayır
	2	Evet
	3	Bilmiyorum
40. soru evet ise 41. soruyla devam edin, aksi takdirde 43. soruya geçin.		
41. Bu incelemeyi kime ya da nereye yaptırdınız?	**……..**	

42. Yapı durumu uygun değilse birşey yaptınız mı?	1	Uygundu
	2	Hayır
	3	Evet
	4	Bilmiyorum
Ev içi hazırlık		
43. Oturduğunuz evin deprem sigortası var mı?	**1**	**Hayır**
	2	**Evet**
	3	**Bilmiyorum**
44. Şuanda deprem çantanız var mı?	0	Hayır
	1	Evet
44. soru evet ise 45. soru ile devam edin, aksi takdirde 46. soruya geçin.		
45. Deprem çantanızın içinde ne var? ***(Seçenekler hiç okunmayacak!)***	**1**	**Sürekli kullandığımız ilaçlar**
	2	**Su**
	3	**Düdük**
	4	**Pilli radyo**
	5	**Yiyecek**
	6	**İlk yardım malzemeleri**
	7	**El feneri**
	8	**Yedek piller**
	9	**Diğer (belirtiniz)**
46. Yatağınızın yanında el feneri var mı?	0	Hayır
	1	Evet
47. Evinizdeki dolap, resim vb. eşyaları sabitlediniz mi?	**1**	**Hayır**
	2	**Evet**
	3	**Kısmen**
48. Yangın söndürücünüz var mı?	0	Hayır
	1	Evet
49. Deprem sonrası ihtiyacı gözeterek evde yiyecek ve su depoladınız mı?	**0**	**Hayır**
	1	**Evet**
50. Deprem sırasında ne yapacağınıza dair ailece bir plan yaptınız mı?	0	Hayır
	1	Evet
50. soru evet ise 51. soru sorulacak, aksi takdirde 52. soruya geçilecek.		

51. Deprem aile planınız varsa bu planı tatbik ettiniz mi?	**0**	**Hayır**
	1	**Evet**
52. Önemli evraklarınızı veya kopyalarını deprem çantanıza veya deprem bölgesi dışında ya da güvenli bir yerde sakladınız mı?	0	Hayır
	1	Evet
53. Deprem ile ilgili bir eğitime ya da kursa katıldınız mı? (İlk yardım, arama kurtarma ya da benzeri kurslar)	**0**	**Hayır**
	1	**Evet**
54. Deprem ile ilgili gönüllü bir kuruluşa katıldınız mı?	0	Hayır
	1	Evet
55. Depreme yönelik konuştuklarımızdan başka hazırlığınız var mı? Varsa belirtiniz.	……	
56. Size son olarak depremler ile ilgili değil ama genel güvenlikle ilgili bir soru soracağım. Son bir ay içinde kendi arabanızda ya da başkasının arabasında ön koltukta oturduğunuz seyahatlerinizi düşünün; Emniyet kemerini ne sıklıkla taktınız? Size okuyacağım seçeneklerden birisini seçin. *(Seçenekler okunacak!)*	1	Böyle bir durum olmadı.
	2	Hiç takmadım.
	3	Seyrek olarak taktım.
	4	Çoğunlukla taktım.
	5	Tümünde taktım.
Teşekkürler!		

Appendix 6: Questionnaire in English

Factors affecting the process of taking action at individual level regarding mitigation and preparedness for an earthquake in Istanbul

Investigator: Sıdıka Tekeli Yeşil

June –July 2007

Questionnaire		
The interviewer will fill in the first four questions		
1. Date		
2. Interviewer		
2a. Supervisor		
3. Respondent, If the interviewee needs help for any reason (health problems, language, etc.), just write the relationship, not the name		
4. District: Sub-district: Street: Cluster no:		
Demographic/socioeconomic data		
5. Gender	1	M
	2	F
6. Age		
7. Marital status	1	Married
	2	Single
	3	Divorced
	4	Living together
8. Number of children living in the home		
9. Educational level	1	Illiterate
	2	Can read and write
	3	Graduate from primary school
	4	Graduate from secondary school
	5	Graduate from high school
	6	University degree or a higher degree

10. How would you assess your economic status?	1	Good
	2	Moderate
	3	Bad
11. Ownership of the home	1	Owner
	2	Tenant
	3	Employer
	4	Belongs to a relative or acquaintance; living there rent-free
	5	Other (please specify)
12. Have you ever experienced an earthquake?	0	No
	1	Yes
13. Have you or a member of your family experienced damage or injury in past earthquakes?	0	No
	1	Yes
14. Did you participate in solidarity and/or rescue activities after any earthquake?	0	No
	1	Yes
Knowledge		
15. What is the cause of earthquakes? I will read you some choices, you can choose more than one choice if you want. *(The choices will be read)*	1	Movement of the tectonic plates and movements in fault zones
	2	Act of God
	3	Solar eclipse
	4	Lunar eclipse
	5	Movements in the deep layers of the earth's surface
	6	Other (please specify)
16. What could be done to mitigate damage due to earthquakes or to reduce the impacts? *(The choices will not be read. Tick one or more choices that correspond to the interviewee's response)*	1	Appropriate ground conditions should be considered/geotechnical investigation of the building site should be performed
	2	Houses should be built according to the recent building codes/well-built, earthquake-resistant houses
	3	Construction quality of the existing houses should be tested and reinforced if needed
	4	Obtain an earthquake insurance
	5	Prepare a family earthquake plan
	6	Prepare an earthquake bag/kit
	7	Have a fire extinguisher and learn how to use it
	8	Secure high furniture to the wall
	9	Learn what to do during and after an earthquake
	10	I do not know
	11	Other (please specify)

17. What should be done during an earthquake?	1	Take cover under a sturdy desk or table, hold on and cover your face and head
	2	Immediately run away by using stairs or lifts
	3	Shelter in a doorway
	4	Other (please specify)
	5	I do not know what to do
18. Can you guess the percentage of buildings that totally collapsed in Izmit during the 1999 earthquake? Please choose one of the choices that I will read. *(The choices will be read)*	1	5%
	2	15%
	3	20%
	4	35%
19. Where did you get information regarding earthquake preparedness? You can choose one or more of the choices that I will read. *(The choices will be read)*	1	TV programmes
	2	Newspapers/magazines
	3	Internet sources
	4	Friends/neighbours/relatives
	5	Programmes in school/neighbourhood/ workplace
	6	Government institutions or local government
	7	Civil society organisations, nongovernmental organizations
	8	Other (please specify)
	9	I have never received any information

Risk awareness/attitude and intention

Questions 20–36
I will read you some statements, please choose the most suitable choice for you (I totally agree, fifty-fifty, totally disagree) for each statement.

	Totally agree	Fifty-fifty	Totally disagree
20. The district that I am living in has a smaller earthquake risk than other districts.			
21. When compared to other sub-districts ours is safer regarding the earthquake risk.			
22. In case of an earthquake my family and/or I would suffer from the impacts.			
23. Nothing will happen to me during an earthquake.			
24. I think that my house is resistant to earthquakes.			

25. In case of an earthquake people experience the things that are written in fortune.			
26. Chance determines whether the impact of an earthquake can be mitigated or avoided			
27. It is possible to mitigate damage with simple measures.			
28. Measures that are taken at home are not effective.			
29. Overall measures in the community should be taken; otherwise individual measures have no meaning.			
30. It is important for me whether the state has taken measures or not.			
31. It is the responsibility of the state/government to take measures before and after earthquakes.			
32. I am influenced by the behaviour of my neighbours, friends and relatives regarding mitigation of damage and preparedness			
33. I am more worried about other threats in daily life.			
34. I think that the expected earthquake will be forgotten after some time.			
35. Turkey has learned lessons from the 1999 earthquakes.			
36. I have also responsibility in mitigation of damage and preparedness for earthquakes.			
Action			
I will ask questions about preparedness. In this part we have again questions in normal format			
37. Are you ready for an earthquake?	1	Yes	
	2	Partly	
	3	No	

If the answer to question 37 is Yes, skip to question 39. If the answer is No or Partly, continue with question 38		
38. Why are you not or only partly ready?	1	We could not come to an agreement with the neighbours.
	2	My house is strong.
	3	I am a tenant.
	4	None of my friends or relatives has done anything.
	5	The state/government has not done anything.
	6	I will move to another district or move in to another house.
	7	I do not have money or economic power.
	8	I do not have time.
	9	It is very expensive to take preventive measures.
	10	Negligence
	11	There are no examples around to see how measures are taken.
	12	Nothing will happen.
	13	Other (please specify).
Question 39 will only be put to interviewees who answer Yes to question 37		
39. Did you try to persuade people around you to take similar measures?	0	No
	1	Yes
Structural measures		
40. Have you had the building tested for construction quality	1	No
	2	Yes
	3	I do not know
If the answer to question 40 is No or Do not know, skip to the question 43. If the answer is Yes, continue with question 41		
41. Who tested the construction quality?		……..
42. Have you done anything if the tests showed that the building was not resistant?	1	The building was resistant
	2	No
	3	Yes
	4	I do not know

Preparedness		
43. Have you obtained earthquake insurance?	1	No
	2	Yes
	3	I do not know
44. Have you got an earthquake bag/kit at home at the moment?	0	No
	1	Yes
If the answer to question 44 is Yes, continue with question 45. If the answer is No, skip to question 46		
45. What do you have in your earthquake bag/kit? *(The choices will not be read)*	1	Prescription medications for the family
	2	Water
	3	Whistle
	4	Portable battery-powered radio
	5	Food
	6	First aid kit
	7	Torch
	8	Extra batteries
	9	Other (please specify)
46. Do you have a torch near the bed?	0	No
	1	Yes
47. Have you secured high furniture, pictures etc. at your home?	1	No
	2	Yes
	3	Partly
48. Do you have a fire extinguisher at home?	0	No
	1	Yes
49. Have you stored food and water in anticipation of an earthquake?	0	No
	1	Yes
50. Have you developed a family plan about what to during and after an earthquake?	0	No
	1	Yes
If the answer to question 50 is Yes, continue with question 51. If the answer is no, skip to question 52		
51. Have you ever practised your plan?	0	No
	1	Yes
52. Have you secured important documents?	0	No
	1	Yes
53. Have you attended a relevant training course?	0	No
	1	Yes

54. Are you a member/volunteer of a relevant nongovernmental or civil society organization?	0	No
	1	Yes
55. Have you taken any other measures than those we have mentioned?	……	
56. Finally, I will ask a question about general safety not related to earthquakes In the last month, have you travelled in the front seat of your own or someone else's car? If you have, how often did you use the seat-belt? Please choose from the choices that I will read. *(The choices will be read)*	1	There was no such situation
	2	I never used the seat-belt
	3	I seldom used the seat-belt.
	4	I often used the seat-belt
	5	I always used the seat-belt
Thank you		

CURRICULUM VITAE

PERSONAL DATA

Name	Sıdıka Tekeli Yeşil
Nationality	Turkish
Date and place of birth	10.03.1973 ADANA
Marital Status	Married, 1 child
Languages	Turkish (mother tongue) English, German
Email	sidika.tekeli-yesil@unibas.ch sidikatekeli@hotmail.com

EDUCATION AND WORKING EXPERIENCE

• Date	01. 10. 2005– 24.06.09
• Title	PhD
• Field	Epidemiology
• University	University of Basel, Switzerland Swiss Tropical Institute, Department of Public Health and Epidemiology Institute of Social and Preventive Medicine
• Thesis	Factors affecting the process of taking action at individual level regarding mitigation and preparedness for an earthquake in İstanbul
• Date	15.04.2002–30. 04. 2004
• Title	MPH
• Field	Public Health
• University	Bielefeld University, Germany
• Thesis	Public Health and Natural Disasters: Disaster preparedness and response in health systems
• Date	14.10.2003–24. 09. 2004
• Title	European Master of Public Health
• University	Bielefeld University in cooperation with ASPHER (Association of Schools of Public Health in the European Region)
• Date	1991–1999
• Title	Licence/Physiotherapist
• University	Istanbul University School of Physical Therapy and Rehabilitation
• Final Assignment	Public Health in Physical Therapy and Rehabilitation
• Date	13. 04. 2004–16. 07. 2004
• Institution	WHO Regional Office for Europe, Department of Disaster Preparedness and Response
• Position	Intern

• Date	01. 12. 1999–02. 02. 2000 / 01. 02. 1999–31. 11. 1999
• Institution	Doğan Hospital / Ömür Hospital, İstanbul
• Position	Physiotherapist

CERTIFICATES/TRAINING

• Date/Place	22–28. 07. 2007, Munich, Germany
• Institution	United Nations University, Institute for Environment and Human Security UNU-EHS/
• Topic	Summer Academy : Megacities: Social vulnerability and resilience building

• Date/Place	18. 02. –01. 03. 2002, London, UK
• Institution	University College London, Centre for International Child Health, Institute of Child Health
• Topic	Essential Public Health

PUBLICATIONS

Book chapters

1) Tekeli Yeşil (in press)
'Being Prepared, Vulnerability in Hazard-prone Megacities: The case of İstanbul'
Günter Brauch et al. (Eds) 'Coping with Global Environmental Change, Disasters and Security Threats, Challenges, Vulnerabilities and Risks' Vol: 5 Hexagon Book Series, Spinger Verlag, Berlin–Heidelberg–New York–Hong Kong–London–Milan–Paris–Tokyo

2)Tekeli Yeşil (in press)
'Home preparedness'
Bradley Penuel, K. & Statler M. (Eds) "Encylopedia of Disaster Relief" Sage Publications, Thousand Oaks, CA

Journals

1)Tekeli Yeşil (2006)
Public Health and Natural Disasters: Disaster Preparedness and Response in Health Systems
Journal of Public Health 14: 317-324

2) Tekeli Yeşil, S; Dedeoğlu, N; Tanner, M; Braun-Fahrländer, C; Obrist, B. (in press) "Why we are not prepared? Identifying factors affecting individual mitigation and preparedness actions related to predicted earthquake in Istanbul" *Disasters*

3) Tekeli Yeşil, S; Dedeoğlu, N; Braun-Fahrländer, C; Tanner, M. (submitted) "Associated factors about individuals' practices regarding earthquake mitigation and preparedness of damage in Istanbul, Turkey" *Risk Analysis*

PRESENTATIONS AT SCIENTIFIC MEETINGS

Invited speaker

1) Ankara–Türkiye 22-26 Oktober 2007
Ministry of Health, Turkey
Health Directorate of Ankara
Emergency Medical Services Congress and III. Ambulance Rally
Presentations: Multidiciplinary cooperation at pre- and post disaster phases
Public and individual trainings for disasters
Congress Proceeding pp: 166-167 and 192-193

2) Athens - Greece 7–12 March 2005
Ministry of Health and Social Welfare, Greece
National School of Public Health, Greece
Workshop: Primary Health Care, Public Health and Disaster Management
Presentation: Public Health and Disaster Management Gaps in Health Systems

Oral presentations

1) 2008
International Disaster and Risk Conference, 25–29 August Davos, Switzerland
Tekeli Yeşil, Dedeoğlu, Tanner, Braun-Fahrlaender (2008) Earthquake mitigation and preparedness at individual level in Istanbul and factors affecting this process
Conference Proceeding pp: 198 - 199

2) 2007
15th World Congress for Disasters and Emergency Medicine, 13–16 May Amsterdam - Netherlands
Tekeli Yeşil, Tanner, Braun-Fahrlaender, Dedeoğlu (2007) Analyzing Factors Affecting Mitigation and Preparedness for an Earthquake at the Individual Level in İstanbul
Congress Proceeding pp: 102

3) 2004
WHO/EURO Department of Disaster Preparedness and Response
Workshop: Strengthening National Disaster Preparedness Capacity of health Systems to respond to Crises 13 - 15 July 2004 Skopje–Macedonia
Presentation: Country Disaster Profiles

PROFESSIONAL MEMBERSHIP

WADEM, The World Association for Disaster and Emergency Medicine
SASBil, Sağlık için Sosyal Bilimler Derneği (Social Science Association for Health)