

Adaptation to Rural Transformation:

A Place-based Investigation into Post-Earthquake Permanent Housing Projects in Eastern Turkey

by

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Declaration

The submission format of this thesis complies with the requirements of the Queen's University Belfast and subject to the examination of the board for the award of PhD in Architecture.

The work presented in this thesis is the original piece of work of the researcher, with the exception of referenced parts. All of the secondary resources used in this thesis are acknowledged in the references. Copies (by any means) either in full, or of extracts, may not be made without prior written consent from the researcher.

No parts of this thesis have been submitted to another institute, university or other type of higher education centre for another degree of qualification. For only academic purposes, the researcher presented and published partially some of the work in this thesis in the following conferences and journal papers.

- i) Yilmaz, D G (2012). (Poster presentation) IDRC 4th International Disaster and Risk Conference, 26-30 August, Davos, Switzerland.
- ii) Yilmaz, D G (2012). (Only presentation) EURORURAL Multifunctional Rural Development, 3-7 September, Brno, Czech Republic.
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New Forest, Southwest England, UK. Published in the proceeding book, pp: 51-60.

- v) Yilmaz, D G (2013). *Stories of rural people living in the settlements built after earthquakes: a case study from the province of Van, Turkey*. ICSS 6th International Conference on Social Sciences, 4-5 October, Kuşadası, İzmir, Turkey. Published in the International Journal of Social Sciences and Humanity Studies (IJ-SSHS) Vol: 5, No:1, pp: 81-91.
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- vii) Yilmaz, D G, Meding, J V and Kacmaz Erk, G (2013). *Post-earthquake permanent housing implementations and the communities affected: a study on rural eastern Turkey*. ANDROID Doctoral School on Disaster Resilience, 23-24 October, Limassol, Cyprus. Published in the proceeding Work Package III, pp: 83-92.
- viii) Yilmaz, D G, Meding, J V and Kacmaz Erk, G (2013). *Post-earthquake damage assessment process and problems in Turkey- a case study in Van province*. DAMAS 10th International Conference on Damage Assessment of Structures, Dublin, Ireland. Published in Key Engineering Materials, Volume of Damage Assessment of Structures X, pp: 310-318.
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- x) Yilmaz, D G (2014). *Adaptation of rural communities and understanding their socio-economic vulnerability for future*. ANDROID 4th International Conference on Building Resilience, 8-10 September, University of Salford, Salford Quays, UK. Published in the journal of Procedia: Economics and Finance, 2014 (18), pp: 536-543.

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Abstract

This doctoral study has been established on the question of ‘How has the implementations of post-earthquake reconstruction affected rural communities and changed the built environment of rural eastern Turkey?’ with reference to the socio-economic and physical vulnerability of rural population in the Eastern Anatolian Region. The region has the highest risk of earthquake exposure in the country and the past experiences showed that rural people in the region lack of capacity to cope with the impacts of earthquakes. In consideration of the vulnerable built environment of rural settlements in the region, the state implements housing projects after earthquakes with the aim of providing seismic-resistant built environment. However, the projects are standardised and, more importantly, after the delivery of houses, no evaluation is conducted by authorities in terms of learning to what extent people are satisfied and how they recover overall in time. In this regard, this study attempts to address this gap and evaluates housing projects and beneficiaries’ recovery in a timeframe from 1992 to 2012. The projects implemented in the provinces of Erzincan, Erzurum and Van are the case studies in the study region. The data collection consists of 240 questionnaires and 35 interviews conducted with the beneficiaries. A number of demographic, socio-economic and physical indicators are examined through statistical analyses and the interviews are used for verbatim quotations. According to the results, the beneficiaries are overall highly satisfied with the houses. Nevertheless, the strength of satisfaction was measured at the highest for the dwellers in Van and at the lowest for the dwellers in Erzincan, which can be linked to the variety of the house plans implemented in Van. The effect of relocation was rather complex. Most dwellers relocated were more satisfied with the implementations, though they had the highest tendency to leave the houses. Most of the respondents stated that they would alter their houses, as was already seen in the implementations of Erzincan. Some dwellers even stated that they would add an extra floor upon their single storey post-earthquake permanent houses. The repayment model of house-loan is also not appropriate for beneficiaries since most do not have regular income, as the interviewees emphasised. With regard to livelihood, the results displayed that rural people in the region are becoming less agriculture-dependent and more interested in jobs with regular income and insurance.

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List of Abbreviations

ADB Asian Development Bank

AFAD Republic of Turkey Prime Ministry Disaster & Emergency Management Presidency

CAT Chamber of Architects of Turkey

CATDAT Damaging Earthquakes Database

EERI Earthquake Engineering Research Institute

EEFIT Earthquake Engineering Field Investigation Team

ICESCR International Covenant on Economic, Social and Cultural Rights (of UN)

IFRC International Federation of Red Cross

IFRC&RCS International Federation of Red Cross and Red Crescent Societies

IRP International Recovery Platform

MOVE Methods for the Improvement of Vulnerability Assessment in Europe (Project)

OECD Organisation for Economic Co-operation and Development

PERI Public Entity Risk Institute

TL Turkish Lira*

TOKI Republic of Turkey Prime Ministry Housing Development Administration of Turkey

TSI (TUIK) Turkish Statistical Institute (Türkiye İstatistik Kurumu)

UN United Nations

UNCHS (Habitat) United Nations Human Settlements Programme

UNISDR United Nations International Strategy for Disaster Reduction

UNNATI Organisation for Development Education (India)

USGS United States Geological Survey (Department)

WB World Bank

(*) 10TL≈2.72£

Attributions

Ministry

It entitles the related governmental body of Turkey, which has been through several changes but substantially remained responsible of settlements, buildings and environment. While it has roots back in the Ottoman Empire, following the establishment of modern republic, from 1928 to 1983, there were two bodies called the Ministry of Public Works and the Ministry of Development and Housing. Between 1983 and 2011, it was united under the Ministry of Public Works and Housing. Since 2011, it is known as the Ministry of Environment and Urban Planning. In this thesis, as different periods of time are referred in different cases and with different purposes, the word is used to refer to the related form of ministry.

Local authority

It entitles the administrative bodies at local level, which are called municipality. According to the current law in Turkey, if the population is over 750.000, then the province is administered as metropolitan municipality. If the population is below, then it is administered as provincial municipality. District municipality and town municipality are for smaller and less populated areas.

Reeve

It entitles the spokesperson in a village who is elected by the villagers. In Turkish, it is ‘muhtar’, and (often he) plays a medium role in the bureaucracy with the state, which is also the case during post-earthquake housing implementations.

Imam

It refers the religious praying leader. In Turkey, every village has a mosque and imam as well as reeve. Imam does not play a role in the bureaucracy, but a strongly respected person by villagers in social life.

Chapter 1

Introduction

This thesis studies the evaluation of post-disaster permanent housing implementations and their influence on dwellers' lives. The particular focus of the study is the evaluation of the post-earthquake permanent houses built by the state in the rural areas of the Eastern Anatolian Region of Turkey through the lens of transformation and investigation of the rural dwellers' experiences over the past twenty years through the lens of adaptation. This introduction establishes the baseline of the study, clarifies the scope and limitations, and explains the structure of the thesis.

1.1 Statement of the research problem and research question

Experiences over the years have shown that the built environment in rural eastern Turkey is particularly vulnerable to earthquakes, and the collapse of owner-built non-engineered masonry structures is often pointed out as the primary cause of loss of lives. For that reason, the authorities in Turkey adopted the approach of transforming the built environment, which includes replacement of local materials (e.g., adobe, clay, and earth) with non-local materials (e.g., concrete and steel) when building earthquake-resistant structures. This approach, however, lacks community participation from the decision-making for the implementation to the completion of reconstruction. As a result, this simplified top-down approach is often unresponsive to local needs and obviously does not consider the socio-economic structure of the regional population.

From a more critical perspective, contrary to the holistic approach of disaster mitigation, the perception of the authorities in Turkey is that provision of permanent shelter is the only work that needs to be completed in the aftermath of an earthquake, and they are only accountable for the interventions in this respect. Despite people's demands for permanent shelter in the first place, the results of earthquakes are highly complicated in the rural areas of eastern Turkey, which gives birth to further demands in the region that are often ignored by the authorities. All of these deficiencies in the reconstruction approach adopted in Turkey limit the success of

projects, which cannot effectively reduce the vulnerability of the rural population or the built environment. Thus, rural people in the region expend effort in different ways to adapt to the changes, which range from physical to socio-economic. In the end, while some adapt successfully, others end up maladapted, which, in some cases, even leads people to abandon the new buildings to return to the former settlement and repair the damaged houses. In the worst case scenario, some migrate out of the region and start a new life. All of these actions indicate how and why vulnerability continues in the region. Accordingly, the research question derived from these statements is as follows:

How has the implementation of post-earthquake reconstruction affected rural communities and changed the built environment of rural eastern Turkey?

Thematic cycle of the research

To better relate the issues highlighted above, Figure 1.1 illustrates the thematic cycle of the research, which has four stages that all shape the focus of this study. The key indicators at the core of the cycle encompass the objectives of the research as they are associated with the post-disaster housing strategy of the state that implies transformation, the adaptation of rural dwellers after they receive the houses, and the continuity of vulnerability as a result of failure during recovery and maladaptation. Each stage is summarised below to provide a brief background to the study.

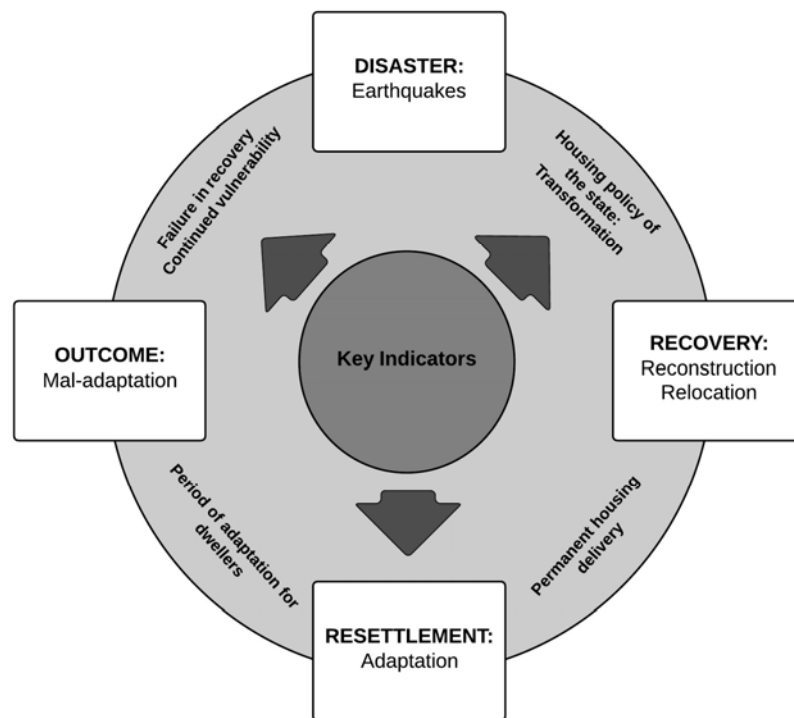


Figure 1.1 Conceptual theme cycle of the research (Author).

DISASTER: Earthquakes

Most of Turkey's land is located on seismically active zones, and the country experiences severe earthquakes at least once every two years (Guney, 2012). As hazard maps reveal, the Eastern Anatolian Region is under higher risk of earthquake exposure than any other region of the country since a large part of it lies on the faults that frequently generate earthquakes. The physical vulnerability of the rural settlements in the region has been revealed as earthquakes have occurred and caused extensive damages to buildings, often resulting in large numbers of casualties and injuries (e.g., the 2011 Van earthquakes). The vulnerability of the built environment is often explained in association with the dominant structure type in the region, which is owner-built non-engineered masonry. Most rural people in the region use local materials such as adobe, clay brick, and rubble stone for the walls, round timber logs and earth-infill for roofing, and mud mortar for plastering when they build houses. These houses are built only with respect to cost concerns, with no regard for seismic resistance. As a result, such buildings often succumb to earthquakes due to the use of poor quality materials and structural faults since the builder has no technical expertise (Spence and Coburn, 1987; Korkmaz et al., 2010; Cetinkaya, 2011; Guney, 2012; Piroglu and Ozakgul, 2013).

RECOVERY: Reconstruction and Relocation

Earthquakes have played a key role in the development of disaster response in Turkey, and over the past few decades, several national governmental organisations have been founded to provide post-disaster permanent houses to survivors. The most widely applied reconstruction strategy is agency-driven since there are two governmental bodies in charge of post-earthquake permanent housing implementations throughout the country. Their implementations are transformative in terms of changing the patterns and characteristics of the built environment in rural areas. The projects are built as reinforced concrete (RC) frame structures with the aim of providing earthquake-resistant houses that replace owner-built non-engineered masonry structures. The house layouts are standardised, and the settlements planned by the authorities usually have buildings aligned to form linear settlements, unlike naturally clustered rural settlements. The implementations are generally built by contractors hired through a bidding system, i.e., for a given settlement, decision-makers of the state announce bidding and assign one of the competing contractors to complete the reconstruction either in the existing settlement or in a relocation site. An owner-driven approach has been attempted but has often turned into agency-driven in-situ reconstruction due to problems that have emerged such as

delays in completion and lower quality of workmanship than expected. In this manner, the authorities in Turkey see earthquakes as an opportunity to implement transformation of the built environment.

RESETTLEMENT: Adaptation

From the perspective of rural communities, such disastrous events generate both physical and psychological needs that make them more vulnerable, and, as they lack the capacity to cope with the results of earthquakes, they desperately wait for the state to complete new development projects. When the survivors are delivered their new houses, they also encounter a new built environment, particularly if the houses are at a relocation site; thus, it takes time for them to adapt the new built environment or, in other words, adapt the built environment according to their needs. Furthermore, since earthquakes affect economic activities, survivors also adapt their livelihoods in different ways. While the progression in the built environment through post-earthquake implementations has an essential role in the development of other circumstances, post-disaster recovery is comprised of multiple aspects that go beyond simply rebuilding the built environment (Contreras et al., 2013; Contreras et al., 2014). However, the authorities in Turkey often disregard the diverse aspects of housing implementation, and, more critically, they do not monitor the post-reconstruction process in terms of evaluating how well projects address needs or whether they fail to improve conditions for the dwellers. In contrast, they adopt an approach that only targets the vulnerable built environment in rural Turkey; hence, the same projects are often applied without considering the effects of the transformation and adaptation of the dwellers in the long run.

OUTCOME: Maladaptation

Although the significance of community-level knowledge in reconstruction and relocation is highly stressed in rural areas and villages (Pande, 2006; Barenstein, 2012), the practice of post-disaster reconstruction in Turkey is often criticised for not taking into consideration region-specific aspects (Cihan, 2010), which have been widely drawn as essential factors for the achievement of post-disaster permanent housing (Wardak et al., 2012). Implementing inappropriate housing projects for the rural environment and communities brings negative outcomes; in other words, the projects fail in recovery. Reconstruction and relocation in this sense are often deemed as pushing transformation and may cause maladaptation of target communities and rejection or even abandonment of newly built settlement, which means, in turn, a waste of time and money for stakeholders. Considering the fact that there is an invisible

link between the continuum of vulnerability of rural communities and their impoverishment in the wake of disasters (Adger et al., 2004; Cannon, 2008; Cardona et al., 2012), in the case of failure to adapt, which is really failure to address long-term strategies, an unsustainable process is undertaken that will inevitably increase vulnerability in the region. Without monitoring the progress of adaptation, there can be no understanding of whether an implementation contributes to good, successful adaptation or harmful, further progression of vulnerability. In this regard, Comerio (2014) placed emphasis on the significance of measuring recovery at different stages and at different time frames that may encompass 10 to 20 years. Comerio wrote (2014, p: 60): “it will be valuable to re-examine the relationship between housing construction and community economic and social stability 10 years after the event to see how the impacted populations have fared”.

1.2 Aims and objectives

In addressing the research question, this study aims to understand the cause-and-effect links between earthquakes, rural communities, and post-earthquake housing reconstruction in the given region. In this regard, the study investigates post-earthquake permanent housing implementations completed in the Eastern Anatolian Region of Turkey within the last two decades in order to identify the key indicators in the interaction involving the transformation of the rural built environment and the adaptation of the rural dwellers. Therefore, with respect to the illustrated cycle (p: 2), the following objectives are outlined for the research.

1. To explore the dimension of rurality and vulnerability in the Eastern Anatolia Region through socio-economic indicators,
2. To understand the traditional aspects of rural housing and the role of the implementations in the change of the architecture in the rural eastern Turkey with relation to the socio-economic challenges of the rural community,
3. To explore the rural dwellers' perspective to the post-earthquake permanent housing implementations and their experience of adaptation to the changing physical and socio-economic environment in the aftermath of earthquakes,
4. To identify the aspects of the transformation of the built environment and the adaptation of rural dwellers as the key indicators leading to success or failure in implementations, and
5. To draw suggestions allowing the inclusion of user-input in the reconstruction process to improve the effectiveness of the post-disaster housing strategy of the state.

1.3 Scope and limitations

This study focuses on rural settlements in the Eastern Anatolian Region of Turkey to investigate the chosen topics from a regional perspective rather than a general outlook. The research extensively combines secondary data with empirical data from the fieldwork conducted in the region at several stages of the research. This is to say that the other geographical regions in Turkey are only mentioned occasionally where necessary to refer to the similarities and differences with the given region in order to strengthen the research observations and findings.

The target population of this study is the rural dwellers living in post-earthquake permanent housing implementations completed in the study region. The study aims to explore their experiences throughout the adaptation period, including their expectations, perceptions, satisfactions, and dissatisfactions within the context of earthquakes and post-earthquake periods. Therefore, the dwellers, as the participants of this study, are the source of data; other stakeholders in the reconstruction process, including decision-makers, governmental and local authorities, contactors and sub-contractors, and governmental and non-governmental organizations are excluded.

This study neither focuses only on technical evaluation (structural, architectural, and planning) of implementations nor examines aspects of different communities (social, economic, and cultural) separately. Rather, it employs a holistic approach to evaluation and examines the aspects in an integrated way to establish cause-and-effect relationships between the issues, which are particular to the region. However, as the results and findings derived from the data gathered from participants are primarily interpreted according to the characteristics of the Eastern Anatolian Region, they may not be applicable to rural communities in other regions, particularly in western Turkey.

Furthermore, it is expected that the study will widen the spectrum of examples of reconstruction and perspectives of dwellers by studying an unusually high number of cases and sample settlements compared with other academic works. While completion of questionnaires was not a challenge in the field, when participants were asked if they wanted to continue and be interviewed, most declined. Therefore, while there is homogeneity within the questionnaire data in terms of the number of completed questionnaires per case, the number of participants who agreed to be interviewed is unequally distributed between the cases. That is to say that since the number of interviewed participants is limited overall, some of the views presented as

quotations in this study may not reflect common views in a particular case and may not be free of bias as they are the words of a small number of participants who might have pointed out extreme issues that took place in their particular settlement. For this reason, the results and findings are primarily derived from the questionnaire data, and the interviews are only used to highlight the particularity of findings.

Last but not least, due to limitations of time and lack of financial support for the fieldwork, the sample settlements were selected based on the proximity of their locations to each other as well as to central areas of the provinces visited. To research the area in a larger extent, more time and financial support are required. Further, conducting such extensive fieldwork with a group of researchers would be more suitable since it is physically exhausting and difficult to organize and may result in an amount of data in excess of what a single researcher can manage. In this respect, the fieldwork was inevitably limited by the researcher's performance in the field and the local guides hired. Despite this, a total of 240 questionnaires were completed successfully in the selected three provinces of the region.

1.4 Significance of the study

Conceptual contribution

In disaster studies engaging rural communities, the topics often emphasised are either the social vulnerability of the community or the deficiencies of the post-disaster housing implementations in terms of the local culture. Only a few have addressed both issues in the context of post-disaster reconstruction. However, the terminological references studies have used are also unclear regarding community and the built environment since they prefer to use one definition to refer to both. In this sense, this study attempts to clarify disaster terminology and links *transformation* with the built environment since it is seen as the result of interventions and implementations performed by outsiders and links *adaptation* with rural communities since it is continuous action at the individual as well as the community scale. As a result, it is believed that the relationship between transformation and adaptation can be drawn more explicitly. In order to better portray adaptation and transformation together, the study explores the natural pattern of a few rural settlements that have not been affected by earthquakes and then focuses on the rural settlements relocated and reconstructed after the earthquakes. This approach builds a comparative research on the physical transformation of rural settlements and strengthens the holistic perspective of the study. In most post-disaster housing reconstruction studies, only the current conditions of the reconstruction examples are

examined and criticised, without referring to the antecedent conditions of the built environment and the role of the community at increasing their susceptibility to hazards.

Contextual contribution

Unlike other disaster-prone countries (e.g., India), there is a certain lack of participatory-based post-disaster permanent housing studies in Turkey. Only a small number of studies were found that were conducted in the Marmara, Central Anatolian and Eastern Anatolian regions of Turkey with a focus on rural dwellers and their satisfaction with housing implementations. However, these studies often lack sufficient evidence to depict the entire picture from the field. In other words, they often disregard or pay little attention to the indicators that might have affected their results. Furthermore, the number of participants in the studies is small, generally equal to or less than 100 and their perspectives are not presented through direct quotations. Hence, the data they provide can be used to build the background of study in this particular field, but are insufficient to interpret the entire contemporary picture. As a result, they are unable to encompass a regional dimension, which is the particular aim of this study. With regard to this lack of evidence, this study provides up-to-date comprehensive empirical data, which not only better frame the picture of the region but can also guide future scholars as well as authorities in charge to recognise the advantages and disadvantages of implementations from the viewpoint of dwellers.

Methodological contribution

Case study is the most widely employed research method in disaster studies. However, studies on Turkey mainly employ a single-case study, and physical examination of housing implementations generally outweighs other aspects. Previous studies have used recent examples as case studies, and they attempt to evaluate the entire reconstruction process and its underlying ideas, decisions, and strategies through these examples. However, it should be noted that focusing on a single case or studying the latest examples is insufficient to observe and evaluate the adaptation of dwellers and also to observe the effects of transformation in the built environment. Accordingly the research design of this study was established on the principles of multiple-case study method and the study uses evidence from multiple sources to evaluate the reconstruction strategy of the state and determine whether the implementations were only replicated without any improvement or the reconstruction strategy was redeveloped for every particular disaster event. In this context, the study includes three case studies of post-earthquake permanent housing implementations, which represent three different periods of

time in the past 20 years. By doing so, it is believed that the issues of transformation and adaptation in the context of this study will be addressed more accurately and more objectively than in the studies with a single case. No example of such study was found in the literature, and, hence, it can be said that it is the first time that a study about eastern Turkey is focusing on the issue from such a holistic perspective. It is expected that knowledge in the previous literature of post-earthquake permanent housing reconstruction in Turkey can be enriched and a better-established methodological approach to disaster studies can be introduced.

1.5 Synopsis of the research method and thesis outline

This study adopts mixed methods research as the methodology since it allows diversity in data types, use of multiple sources of evidence and triangulation between results. Questionnaire surveying and interviewing are utilised as the primary data collection tool, beside direct observation throughout the fieldworks. Maps and drawings are also widely used to familiarise the reader with the area studied. The fieldwork was undertaken in three phases that each differently contributed to the study. The purpose of the first two phases was to learn from the field, gain experience of contacting people, and become familiar with their built environment. The third phase was the direct contact with dwellers and provided the survey data used for the exploration of transformation in the built environment and adaptation of rural dwellers living in post-earthquake permanent houses built by the state in the Eastern Anatolian Region. The sequential phases in the study are also reflected into the organisation and content of the chapters so that the entirety of research can be presented more clearly and extensively providing accurate evidence and explicitly addressing the aims and objectives of the study. The content of each chapter is as follows.

Chapter 2 Review of theoretical perspectives and examples of post-earthquake permanent housing

The first part of this chapter provides a review of the conceptual perspectives in disaster and disaster recovery. This is to clarify the terminology used in disasters and to establish the theoretical perspective of the study. The second part explores the earthquake experiences and reconstruction approaches to post-earthquake housing in India, China, Italy, and Japan, which are the countries most frequently exposed to earthquakes. This is to relate the theoretical perspectives with the practical approaches. The chapter concludes with a critical review of the approaches and the highlights of key learning points.

Chapter 3 Rurality and an exploratory pilot fieldwork on the traditional built environment in rural eastern Turkey

This chapter discusses the concept of rurality and highlights why the region studied is considered the most vulnerable in the country. Accordingly, the first part of the chapter introduces additional literature to emphasise the significance of the region. The second part presents the exploratory pilot fieldwork, which brings to light current construction practices in rural settlements of the region and critiques the influence of modernisation on communities and on their construction practices.

Chapter 4 Research methodology

This chapter begins with a general review of qualitative and quantitative methodologies with a focus on mixed methods research. The review of the methodological approaches suggested for disaster studies follows. The research agenda of the study is illustrated and explained through the major steps including the selection and design of the survey tools, the data collection process and the data analysis process. The part explaining the design of the survey tools elucidates the evaluative approach adopted and the selection of indicators to-be included based on an analytical review of the studies found in the scope of post-disaster housing, including but not limited to earthquakes, and regeneration projects either in Turkey or elsewhere. Provisional suppositions regarding the indicators selected are discussed as well. Finally, the trustworthiness of the study is assessed through the values of truth, applicability, consistency, and neutrality.

Chapter 5 Post-earthquake permanent housing reconstruction strategy in rural eastern Turkey and case studies from the past 20 years

This chapter firstly explains the post-disaster housing strategy in Turkey and reviews several projects completed in different areas of the country through additional literature. Secondly, it discovers the case studies and brings the details of the post-earthquake permanent housing projects implemented in three provinces, Van, Erzurum and Erzincan, of the rural Eastern Anatolian Region. Each province is studied through its demographic and geographic characteristics and seismic activities in general, and the extended details of the sampled 17 villages are presented in the related appendix. Within the chapter, the earthquake experiences and the related post-earthquake permanent housing implementations are given in details. The chapter concludes with a review of the case studies also highlighting the observations in the villages sampled.

Chapter 6 Results of analyses and key findings

This chapter presents the empirical data of the study, which consists of the results of statistical data analysis using SPSS 21 of 240 questionnaires and the quotations from 35 interviews conducted with the rural dwellers. The statistical analyses of the questionnaires are presented in two parts: descriptive analysis to provide participants' profiles and inferential analyses to explore the relationships between the indicators. Correlation, one-way ANOVA between-groups, independent sample t-test, and cross-tabulation are used in the latter category. The interviews are examined in full through the themes of migration, livelihood, reconstruction strategy, and post-occupancy evaluation. The full list of the interviewees is presented in an appendix. A discussion linking the results of the both datasets and highlighting the similarities and differences between the case studies concludes the chapter.

Chapter 7 Conclusion

This chapter provides a critical review of the research findings and discusses under the main themes of the study: transformation and adaptation. It highlights the significant results and compares them with previous examples and results of prior studies. An evaluation framework is suggested that values the significance of learning from the user after implementations are completed. Further research questions and recommendations for future scholars are provided. Concluding remarks are made on the different aspects of the Eastern Anatolian Region of Turkey in particular based on the researcher's field experience in the area.

Chapter 2

Review of theoretical perspectives and examples of post-earthquake permanent housing

This chapter begins with providing an understanding of vulnerability and resiliency as the main concepts of disaster studies, and then branches out to adaptation, coping capacity, risk reduction, mitigation, reconstruction, relocation, and concludes with the legitimated concept of adequate housing. The vulnerability of rural areas to earthquakes is highlighted to emphasise why the study focuses on the rural. Following this, reconstruction approaches to post-earthquake permanent housing in India, China, Italy, and Japan are reviewed. A discussion highlighting the key learning points of the literature review concludes the chapter.

2.1 Conceptual background to understanding disasters

Natural calamities used to be understood as mere physical processes that occur unexpectedly, destroying the built environment and causing losses; this was the dominant paradigm in the interpretation of disasters (Alexander, 2001; Fordham et al., 2013). This paradigm claims the lacking quality of the physical environment as the fundamental reason for life and property losses and seeks solutions in the improvement of engineering to develop methods of reinforcement, structural materials, and systems that can resist specific disasters. However, this understanding had been criticised for the past two decades, referring to the lack of consideration of social factors and differences in human-based systems (Mileti 1999; Fordham et al., 2013). That is to say, worldwide experiences have proven that differences in demographic characteristics cause disaster results at different levels of impact. For example, the Chilean earthquake in 2010 struck with 8.8 M and caused about 500 deaths, while the Kashmir earthquake in 2005 struck with 7.6 M but killed more than 100,000. Comparing such results emphasises the significance of demographic and socio-economic characteristics of populations in the pre-disaster period that may put them at higher risk and increase their vulnerability to hazards (Mileti 1999; Alexander 2001; Hutton, 2001).

Limited understanding of and achievement resulting from the dominant paradigm has therefore urged the need for a more encompassing concept that can be used to understand the impact of disasters. In this regard, vulnerability has emerged as the incorporated result of the relationships between social, economic, and political characteristics of communities (Fordham et al., 2013). The combination of such diverse pre-disaster factors within the concept of vulnerability evoked the development of a causation model to explain the impacts of disasters that claim all of the factors are driving forces in the progression of vulnerability (Wisner et al., 2004; Birkmann, 2007). Meanwhile, the increase in the volume of terminology used in disaster studies requires the explicit clarification of the terms such as mitigation, resilience, adaptation, coping, and adaptive capacity, to better understand the models (Smit and Wandel, 2006). Accordingly, the following section of the chapter aims to elucidate the given terms widely used in the disaster research area, which also establish the theoretical perspective of the study.

2.1.1 Vulnerability & Resiliency

In a general social context, vulnerability refers to particular groups such as women, children, the elderly, and the disabled; it is used economically to refer people who suffer from poverty; and it is used politically to refer members of marginalised groups in society (Cannon, 2008). This is a taxonomic approach to society, which is, in a disaster context, the idea that some are at higher risk and in worse conditions compared to others (Wisner et al., 2004). For instance, suffering due to economic disparities, e.g., unequal income distribution or dependence on a specific source of livelihood, exemplifies the economic aspect of vulnerability (Wisner et al., 2004; Fordham et al., 2013). Considering such fragile characteristics, it is now accepted that natural disasters do not have unexpected results, but are predictable (Mileti, 1999) since their impacts are not equal in different communities.

Such a widened perspective of vulnerability has allowed construction of a holistic approach that better explains cause-and-effect relationships in natural disasters (Cardona et al., 2012). In Birkmann's illustration (Fig. 2.1), vulnerability grows from a one-dimensional approach to a multi-dimensional approach, i.e. from individuality to community, and encompasses exposure, susceptibility, coping and adaptive capacity, and institutional features of communities (Birkmann, 2005; Birkmann et al., 2007; MOVE, 2011; Cardona et al., 2012). The figure clarifies that the concept of vulnerability entails disaster risk, which is a compound of three elements: hazard exposure, characteristics of a hazard, and a vulnerable population (Birkmann, 2007). In the absence of one of these, disaster risk cannot be evaluated since disaster itself is

also a compound of two elements: hazard and vulnerability (Wisner et al., 2004). That means, exposure is essential to define risk but is not sufficient by itself (Cardona et al., 2012). It becomes a concern only when it refers to the susceptibility of a population, which covers lacking conditions and weaknesses of physical, social, cultural, economic, ecological, and capacity issues (MOVE, 2011).

Blaikie et al., (in 1994) introduced the pressure and release (PAR) model (Fig. 2.2), which shows how deeply the root causes of vulnerability exist, extending back to socio-economic dynamics. To explain the model, all of the elements in the progression of vulnerability put so much pressure on the pre-conditions that when a hazard strikes, this releases the pressure and turns the hazard into a disaster (Wisner et al., 2004). Although the model is sufficient to conceptualise the background of vulnerability, it has also been found deficient in some respects as it does not offer suggestions about how to strategically reduce disaster risk (Wisner et al., 2004; Niekerk 2005; Cutter et al., 2008; Preston et al., 2011). Hence, various models to better conceptualise vulnerability have been sought to determine the appropriate measures and instruments to link mitigation and adaptation to develop solutions to address disaster risk and increase resiliency (Birkmann, 2007; Preston et al., 2011; MOVE, 2011; Fordham et al., 2013). Firstly, the explanations of vulnerability and resiliency have been a dilemma since both are accompanied by *hazards* (Cutter, 1996; Cutter et al., 2003; Paul, 2011; Manyena, 2009; Manyena et al., 2011). Their reciprocity lies under the equivalence that being vulnerable means lack of resilience or high resilience means less vulnerability (Cardona et al., 2012).

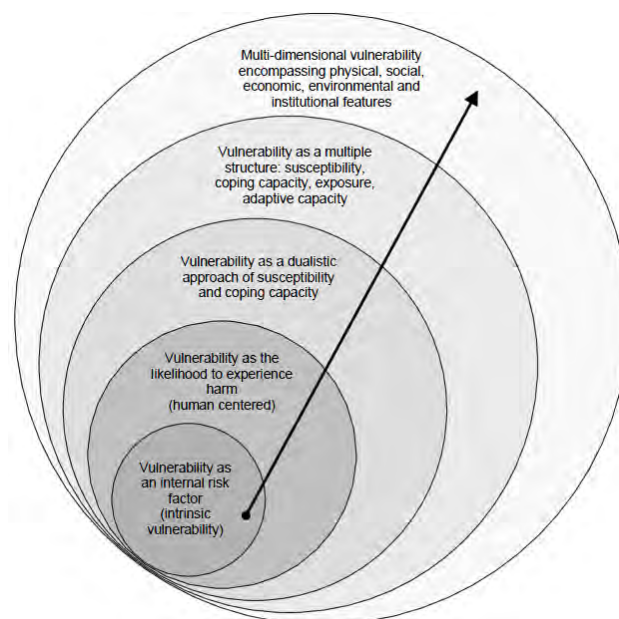


Figure 2.1 The conceptual expansion of vulnerability (Birkmann, 2005).

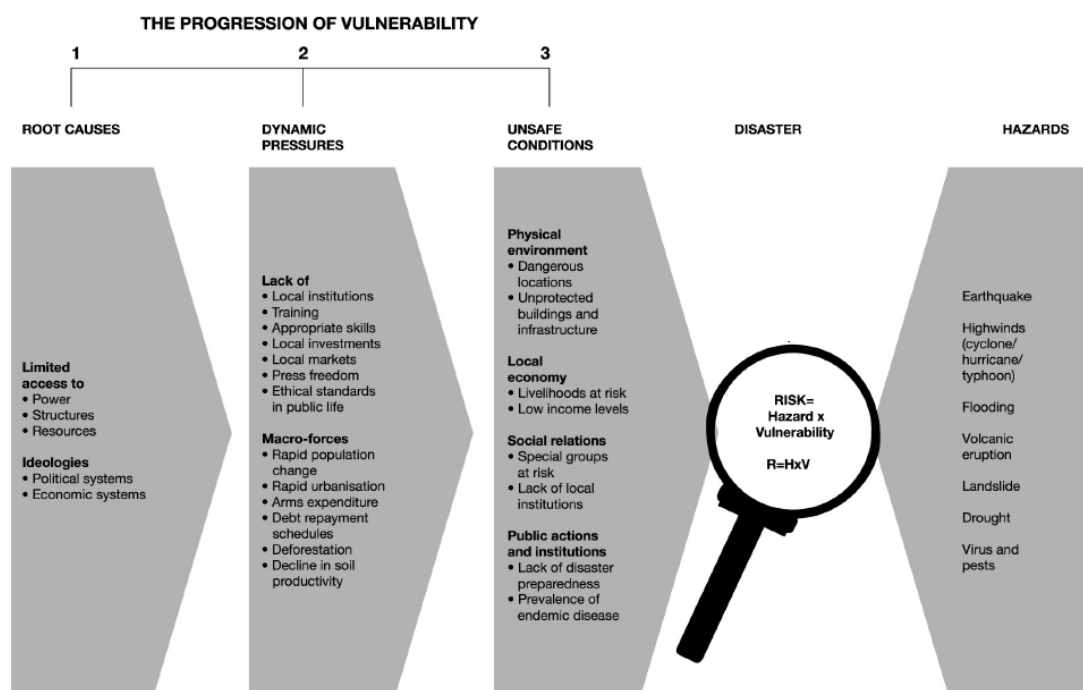


Figure 2.2 The PAR model illustrating the root causes feeding the progression of vulnerability (Wisner et al., 2004).

Indeed, resilience is one of the determinant factors of vulnerability and entails capacity of coping with disasters and recovery; in other words, it is the ability to absorb the effects of disaster (MOVE, 2011). What differentiates the two terms is the way they deal with disaster risk. Vulnerability is constructed on the underlying factors of risk, which are the probability of hazards, potential primary impacts of hazards (i.e., life, property, and financial loss), and potential secondary impacts of hazards (i.e., disruption in the systems of society, governance, institutional, and economy) (Birkmann, 2007; Cutter et al., 2009; Manyena, 2009; Manyena et al., 2011; Paul, 2011; Cardona et al., 2012).

In contrast, resilience is concerned with the actions taken to reduce vulnerability. Disaster prevention, mitigation, capacity building, and adaptation are terms that have been established in the context of resilience (Cutter et al., 2009; MOVE, 2011; Cardona et al., 2012; Paul, 2011). To say, resilience is largely embodied within the concept of disaster risk reduction and to improve resiliency is deemed the primary task necessary to accomplish effective and sustainable disaster risk reduction (Birkmann, 2007; MOVE, 2011). Actions for resilience take place both in pre-disaster and post-disaster periods. For example, post-disaster interventions and implementations for reconstruction of the destroyed built environment aim to recover property losses; however, these actions also facilitate disaster prevention as they also aim to reduce physical vulnerability so that the risk of future damages and losses can be prevented (Manyena, 2009; Manyena et al., 2011).

In this sense, vulnerability is more of a negative concept than resilience (Birkmann, 2007; MOVE, 2011). In addition, although resilience can be used to describe the physical environment (Adger et al., 2004), today it is mainly employed to refer to reducing the susceptibility of societies (Haigh and Amaratunga, 2010) through increasing coping and adaptive capacity to enable them to cope with disasters (MOVE, 2011; Paul, 2011).

2.1.2 Adaptation & Coping

A further relationship has also been defined between vulnerability, resilience, and adaptation based on the assumption that the results of adaptation have diverse effects on both vulnerability and resilience (Wisner et al., 2004). Adaptation is defined as a long-term process in which social systems gain the ability to cope with disasters and reorganise and adapt themselves to changes undertaken as interventions to mitigate disasters (Birkmann et al., 2008; Cutter et al., 2008; MOVE, 2011). Adaptation is associated with resilience in a positive sense because, if adaptation strategies are applied appropriately and are successful, then reduction of vulnerability in the long term will be accomplished. Otherwise, in the case of failure in adaptation, i.e. maladaptation, or failure in addressing long-term strategies, an unsustainable process likely results in increased vulnerability (Adger et al., 2004; Cardona et al., 2012).

Therefore, in order to build resilience through successful adaptation, adaptation strategies must address certain goals of risk reduction. The first distinction should be made between interventions targeting hazards and interventions targeting society. Interventions targeting hazards aim to prevent hazards from occurring (when possible) or allow society to gain the ability to live with a specific hazard without disruptions occurring. Interventions targeting society may include reducing the risk of exposure (e.g., by way of early warning systems), reducing susceptibility (e.g., relocating human settlements away from flood-prone areas), and improving resilience (e.g., strengthening and sustaining livelihood sources and activities) (MOVE, 2011). To say, adaptation as a long-term process covering pre-disaster and post-disaster periods incorporates all of the proactive actions and interventions addressing the aim of reducing future risk. In other words, disaster risk reduction and adaptation are inherently linked to each other (Cardona et al., 2012). The simplified framework given in Figure 2.3 draws the relationship between hazards, vulnerability (as lack of resilience), and adaptation.

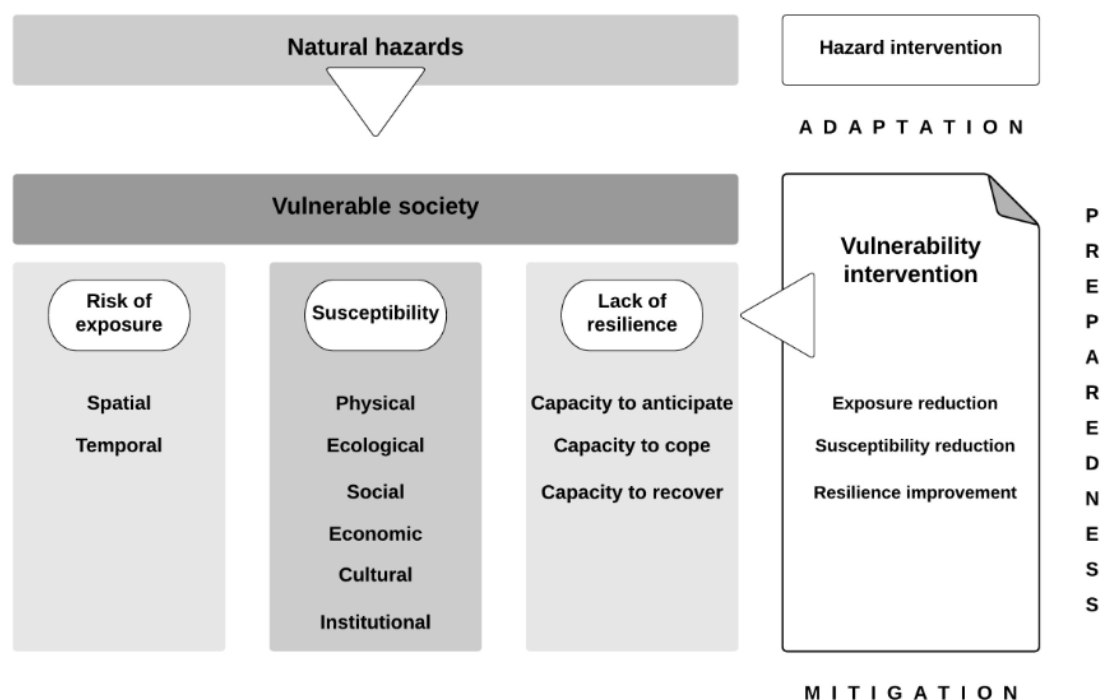


Figure 2.3 Framework illustrating the relationship between vulnerability, resiliency, and adaptation (Simplified and redrawn from MOVE, 2011).

Another relationship exists between coping, adaptation, and adaptive capacity (Adger et al., 2004; Cutter et al., 2008), and all have been deemed central themes of resilience (Paul, 2011). Ability to cope with disasters has been recognised as an indicative measure of vulnerability (Birkmann, 2005; MOVE, 2011). It defines the capacity of a society and organisations to have resources available, to make the appropriate use of resources, and to recover needs according to the hierarchy in case of a hazardous event (Wisner et al., 2004; Birkmann, 2006). A high level of coping capacity means less extremity and vulnerability in case of a disaster (Cardona et al., 2012). The most distinctive characteristic of coping and adaptation is the timescale. Coping refers to response to disaster impact, whereas adaptation is a considerably slow action in which a wide range of changes occur not only in the physical environment but also in social, economic, and even political systems (Adger et al., 2004; Birkmann et al., 2008; Cardona et al., 2012). Time is required to understand whether adaptation leads to progressive or regressive changes after a disaster (Adger et al., 2004; Birkmann et al., 2008). Figure 2.4 show that, in the long-run, coping is evoked from adaptation (Birkmann, 2009; 2011). Adaptive capacity refers to the potential for adaptation rather than the actual process (Adger et al., 2004), and, along with coping, it is considered one of the measures of vulnerability (Birkmann, 2005). The limits and measures of the adaptation process determine adaptive capacity, which is defined as the ability of a system to adjust its flaws based on experiences. This, in turn, affects the extent of coping with disasters (Cardona et al., 2012).

Adaptation is also embodied in transformation. According to Pelling et al., (2014), transformation encompasses ‘options for fundamental change as part of adaptation choices’, and its progression shows ‘the depth of change’. The authors also emphasised that transformation is a way of expressing preferences among the choices that a society has made, which may stabilise the current system by reproducing it or may adjust it by integrating with new systems.

Adaptation is more familiarised in developmental plans, programmes, and studies that mainly have a scope including environmental issues and livelihood strategies (e.g., development of rural communities in Africa against drought and famine). Adaptation occurs in a positive direction if there is diversification in the livelihoods of people. Hence, adaptation is also multi-dimensional like vulnerability, and it is often examined from trans-disciplinary perspective (Clark, 2011). As mentioned earlier, adaptation encompasses different dynamics categorised into five groups: human capital (at the individual level, e.g., education and employability skills), social capital (relationships between individuals and within communities), physical capital (the man-made environment, e.g. buildings, superstructures, and infrastructure), natural capital (geographical features, e.g. fertility of the soil, soil liquefaction, and water resources), and financial capital (level of monetary resources) (AEA, 2012). Though the progress in each type of capital proceeds dependently, they are not interlinked explicitly within the concept of adaptation. It is the lens of adaptive capacity that clearly investigates all dynamics and progresses of adaptation as interdependent (AEA, 2012; LKCCAP, n.d).

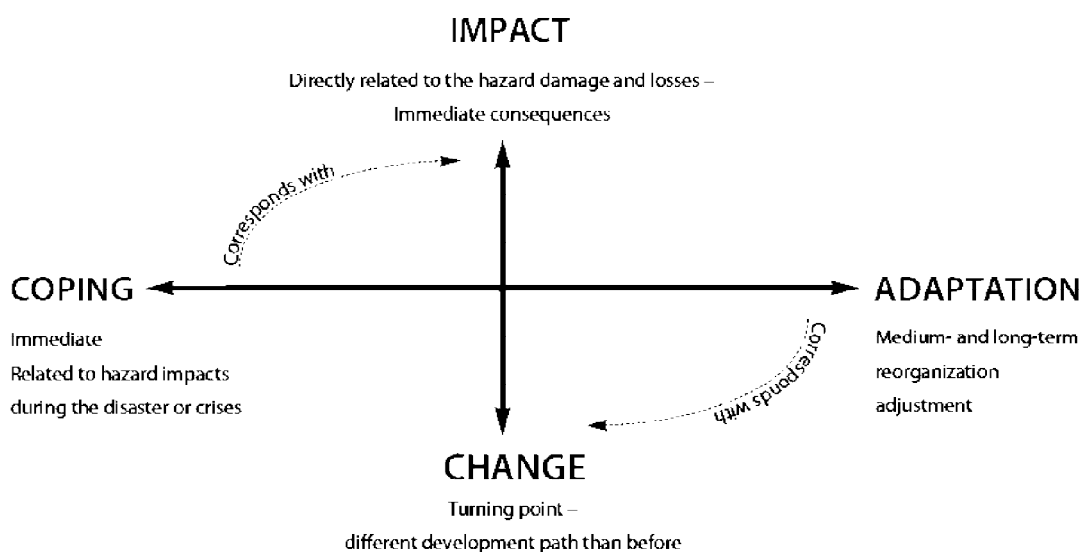


Figure 2.4 Figure illustrating the corresponding relationships between impact and coping and between adaptation and change (Birkmann et al., 2009).

2.1.3 Risk Reduction & Mitigation

Diverse impacts of disasters initiate direct and indirect changes (e.g., migration and livelihood patterns) as illustrated in Figure 2.5 (Birkmann et al., 2008). Generally, the aftermath of a disaster is deemed an opportunity to prompt positive changes with the aim of building resilience both with structural (physical) and non-structural (social) measures (Pelling and Dill, 2008; Birkmann et al., 2008; Frerks et al., 2011; MOVE, 2011). Changes are usually planned and implemented by policymakers and authorities as part of interventions specified for disaster prevention and risk mitigation within the framework of disaster risk reduction (Cardona, 2003; Birkmann, 2007; Cutter et al., 2008; MOVE, 2011). Disaster risk reduction is today largely recognised as a multidisciplinary task that should entail a holistic perspective. This approach requires in-depth understanding of problematic factors that cause vulnerability to hazards or emerge after disasters. From this viewpoint, disaster prevention and risk mitigation are approaches sharing the basic measures of vulnerability reduction and adaptation (Cardona, 2003). However, unlike the relationship of adaptation with resilience and vulnerability, which is more results-based, the relationship between adaptation and risk mitigation is more process-based as both are defined by means of measures to achieve the goal of disaster risk reduction (Cutter et al., 2008; Ayers and Huq, 2008; MOVE, 2011; Kaswan, 2013). Thus, integrating the strategies defined for adaptation and mitigation is deemed the optimum way to reduce the risks and impacts of hazards before they become disasters (Adger et al., 2004; Birkmann, 2005).

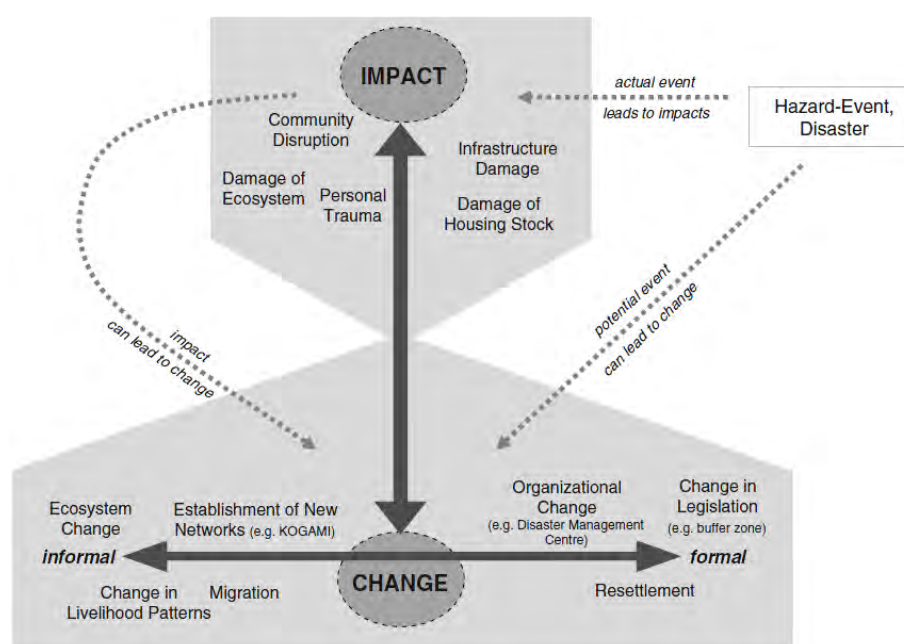


Figure 2.5 The links between and within occurrences of impacts and change (Birkmann et al., 2008).

Otherwise, separation of strategies and use of processes with unrelated measures of adaptation and mitigation will most likely result in unsustainable and more regressive changes, which are contrary to the aim of disaster risk reduction. Consequently, models for disaster risk reduction are developed in a way that integrates adaptation and mitigation rather than dealing only with post-disaster periods, which focus upon response and relief (Bosher, 2008). Preparing resources only for response and relief is no longer acceptable in the scheme of disaster preparedness. Rather, employing a holistic approach that considers mitigation, adaptation, vulnerability, and resilience together and examines and addresses needs is far more effective since it provides better results in the long-run (Birkmann, 2006). Instead of a top-down approach that provides non-specific solutions for cases, adopting a bottom-up approach that seeks case-specific initiatives by understanding the social and physical environment as a whole respects the significance of community-based local knowledge in the development of risk reduction (Bosher, 2008). This understanding of vulnerability has brought about the redesign of the globally recognised disaster management cycle outlined in Figure 2.6.

In addition, since not every country suffers from the same types of hazards and each possesses specific expertise, each should prepare itself by knowing how specific hazards potentially damage the physical environment and disrupt human activities. This is the first step of disaster risk reduction and all the activities defined in preparedness, recovery, and rehabilitation are carried out cooperatively and follow hazard identification. However, disaster risk reduction through risk management should examine vulnerabilities and risks at the local level in specific areas where hazards have affected or are anticipated to affect people and settlements. General concepts and understanding should be adapted to cases and local knowledge (Ammann, 2006; Bosher, 2008; Birkmann et al., 2009) following the steps in Figure 2.7.



Figure 2.6 The management cycle following a disaster (Gour, 2013).



Figure 2.7 A case-specific disaster risk management cycle (Ammann, 2006).

The importance of locality in disaster risk reduction lies in the interactions among stakeholders, local authorities, donors, and agencies. Without knowing the strengths and weaknesses in social relationships and hierarchical systems in society, successful coordination between stakeholders and effective use of resources cannot be achieved (IFRC, 2012). Implementing top-down solutions after disasters will most likely be temporary and at superficial levels and will not cure the source of problem, *the root causes*.

Accordingly, as mentioned earlier, different models have been introduced in the last decade with a focus on feedback-loops between pre-disaster conditions (e.g., levels of vulnerability and capacity) and post-disaster actions (e.g., mitigative and preventive interventions). The emphasis is placed on the continuity of learning from disasters through evaluating the effectiveness of actions taken and decisions made. The suggested feedback loops entails re-examining of the measures and strategies adopted before disaster, finding deficiencies by way of experiences and learning, and, as a consequence, revising them according to needs that arise after disaster (Wisner et al., 2004; Birkmann, 2006; Cutter et al., 2008; Birkmann et al., 2009; Cardona et al., 2012). Learning is required to prevent repetition of failed interventions. However, although learning is also necessary at the governance level, the term is widely used in reference to social learning (Cutter et al., 2008; Birkmann et al., 2009). Learning has been deemed a significant part of adaptive capacity as long as it leads better decision-making (Cutter et al., 2008). Notwithstanding, it is important to examine the different interpretations of adaptive capacity as it is based on locality and time. Locality refers to geographical boundaries (e.g., national or regional) as well as social boundaries (e.g., community, group, or individual). Knowledge of adaptive capacity at the community level has been found to be more reflective of observed regional dynamics and progresses (Smit and Wandel, 2006).

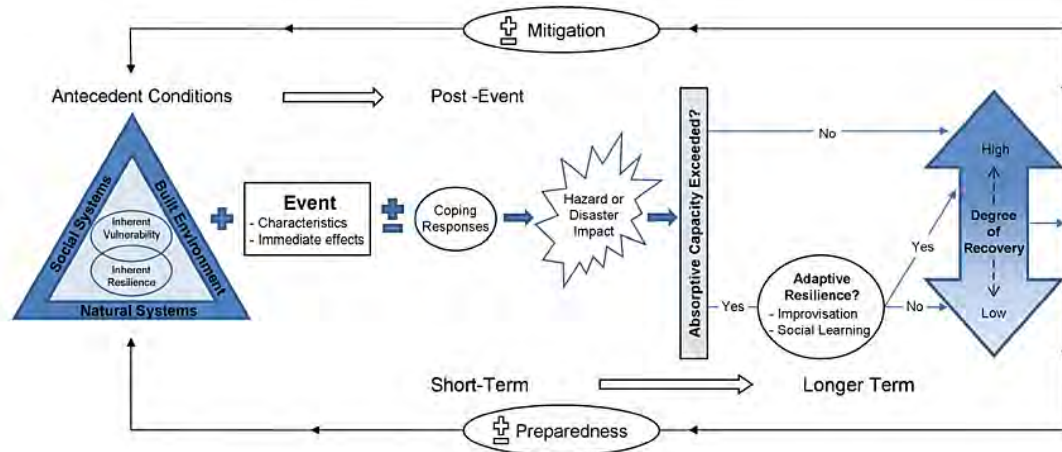


Figure 2.8 The disaster resilience of the place (DROP) model (Cutter et al., 2008).

To be more specific, socio-geographic adaptive capacity, as a term explicitly defined, links the dynamics of socio-economic and cultural characteristics as well as environmental and institutional structures of communities living in a particular area (LKCCAP, n.d). This is why adaptation is embodied with local knowledge as stated earlier. This inference points to the power of social learning in resilience. As long as the societies have the habit of learning from their disaster experiences and institutions are aware of their accountability, they will contribute to their own resilience as well as the resilience of their places by understanding cause and effect relationships with antecedent conditions (Cutter et al., 2008). Accordingly, Cutter et al., (2008) developed their conceptual model (Fig. 2.8) by stressing improvisation and social learning in the adaptation process towards resilience.

2.1.4 Reconstruction & Relocation

Although the dominant paradigm has been replaced by the holistic concept of vulnerability, the resulting perspective still puts damages and losses in physical environment first in the case of a disastrous event (Peduzzi, 2006; Peduzzi et al., 2009). This is the result of the spatial dimension of disasters as its visible consequences are loss of life, basically due to collapse of buildings (Haigh and Amaratunga, 2010). It is also widely understood that the built environment itself plays a role that may either extend the impacts of disasters and cause to worse and more chaotic conditions (e.g., in case of an earthquake, collapse of a local hospital may cause further deaths due to the lack of emergency aid, or collapsed roads may delay the access of rescue teams to the affected area) or prevent further damages and disruptions within society by being able to withstand hazards to maintain the assets required by society to coordinate the event without any further chaos (Bosher, 2008). This issue points the significant role the built

environment plays in societies' resilience (Haigh and Amaratunga, 2010). Accordingly, the focus is again on the performance and design aspects of the built environment. Although the initiatives may appear similar to the dominant paradigm, a wider perspective is gained regarding decisions about disaster risk reduction and local knowledge. For example, fishery communities are obliged to live in coastal areas even if the area they live may be prone to hazards (Wisner et al., 2004; United Nations ISDR, 2004; Cannon, 2008). In such case, relocating communities to irrelevant but safer areas where they cannot continue their livelihood activities is not a responsive intervention. If this is the deliberate solution to be applied, then employment skills and opportunities should be considered as a long-term impact of intervention. Otherwise, if a community resists inhabiting in exposure area, then plans for settlements and housing should be redeveloped in a more resilient manner through lessons learned from past experiences (Bosher, 2008; IFRC, 2012).

Disasters are also deemed as a 'window of opportunity' that facilitates 'building back better', not only for the built environment, but also for the potential redevelopment of social, political, and economic systems (United Nations ISDR, 2004; Birkmann et al., 2008; Pelling and Dill, 2008). Hence, today, the vision of recovery is more holistic since steps for disaster mitigation are taken towards preparedness with the aim of building back the built environment better in addition to increasing the adaptive and coping capacities of affected communities (PERI, 2001; Paton, 2006; MOVE, 2011; Manyena et al., 2011; Gour, 2013; Lindell, 2013). Furthermore, the involvement of affected communities is necessary to initiate a sense of collaboration and ownership (PERI, 2001; Paton, 2006; Pandey and Okazaki, 2005; Hossain, 2013).

Such a holistic approach to disaster recovery allows an in-depth understanding of temporal and spatial context of disastrous events through interdisciplinary work. However, in practice, disaster recovery is generally simplified into the reconstruction of the devastated built environment since the results are visual (Nakagawa and Shaw, 2004), and the social dimension is neglected by authorities (Cutter et al., 2003; Wisner et al., 2004; Adger et al., 2004; Birkmann, 2007; MOVE, 2011; Cardona et al., 2012). This approach is the result of difficulty in monitoring, quantifying, and mapping the various aspects of vulnerability, which requires both statistical and participatory approaches in order to portray the complexity between variables that include geographical, physical, demographic, social, economic, and even political factors (Cardona, 2003; Cutter et al., 2003; Adger et al., 2004; Cardona et al., 2012). As a consequence, providing permanent house forms the largest part of reconstruction and often conducted rapidly (UN, 1982).

Reconstruction is indeed an attempt to transform settlements and to improve the living conditions of people while at the same time mitigating the probable impacts of natural hazards in the future (MOVE, 2011). It is an understandable challenge, particularly in the eyes of authority, since it urges a large volume of construction within a short time and with a limited budget (Shaw and Ahmed, 2010; Felix et al., 2013). Hence, a top-down approach is generally implemented using standardised units, regardless of the size of households, through unfamiliar, rapid construction technologies (UN, 1982; Boano and Hunter, 2012). Jigyasu (2013), referring to rural settlements, stated that most housing implementations bring outside technology as it is easy to duplicate but overlook the local potential. Such reconstruction implementations are usually unsustainable and sometimes end up being abandoned as they are developed in isolation from the actual local conditions, constraints, and preferences (Barakat, 2003). Barakat (2003) highlighted that housing implementations should particularly address people's needs, perceptions, and expectations and should use local resources whenever possible. Boano and Hunter (2012) illustrated the diversity of inputs that should be regarded in the reconstruction of a disaster-affected area (Fig. 2.9).

Furthermore, during rapid reconstruction, relocation of settlements is highly preferred to avoid debris removal and facilitate easy land arrangements, though it may also be used to reduce the risk of exposure by vacating hazard-prone areas. In this sense, relocation seems practical and reasonable, but, in most cases, it has particular drawbacks for local communities. The primary challenge is the place attachment of people and communities, which is formed strategically or inherently (UN, 1982; PERI, 2001; United Nations ISDR, 2004; Berke and Campanella, 2006; World Bank, 2010; Audefroy, 2010; Shaw and Ahmed, 2010; Wardak et al., 2012). At this point in particular, integrating community-level knowledge in reconstruction and relocation is highly recommended for rural areas and villages (Pande, 2006; Barenstein, 2012). Jigyasu (2013) emphasised that most housing implementations in relocation sites built for rural communities copy urban-like, grid-pattern settlements by overlooking the naturally formed patterns of villages, and are generally found incompatible. It is known that relocated settlements should be planned with consideration of relationships within a community (e.g., kinship) and should provide developmental interventions (e.g., infrastructure) (Barakat, 2003). Numerous global examples have shown that implementations that have not considered the local community are problematic and do not provide adequate housing (Mileti, 1999; Pandey and Okazaki, 2005; World Bank, 2010; Barenstein, 2012; Wardak et al., 2012; Hossain, 2013).

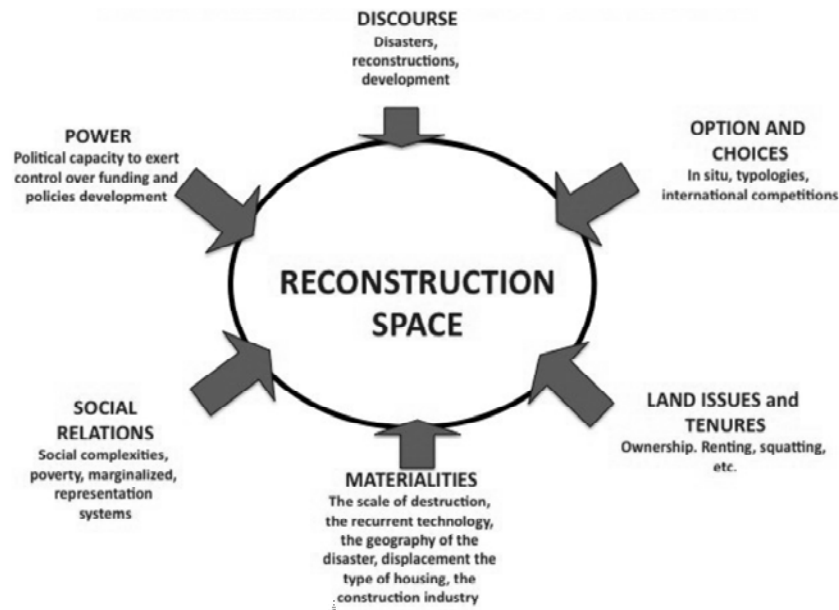


Figure 2.9 The array of reconstruction forces that should be considered before reconstruction (Boano and Hunter, 2012).

The contribution of the architectural practice is also arguable since it is believed, often by authorities, that architecture is unnecessary for serving essential needs in the post-disaster built environment. Contrarily, architects can play an effective role in better coordination of the elements of cost-effectiveness and environment respecting a community's socio-cultural aspects (Boano and Hunter, 2012). The words of the award-winner Taiwanese architect Hsieh Ying Chun, who designed a village in rural China afterwards the Sichuan earthquake in 2008, are included to demonstrate the value of architecture in reconstruction projects;

“Architecture is the largest cultural accumulation of humanity. It is collective social behaviour, and individuality is barely recognised. (...) Reconstruction is different from the temporary disaster relief. We work towards solving problems accumulated over the years; therefore, our work is not specifically aimed at the post-disaster area, but rather at livelihoods and homes for all the common people” (in the book of *Humanitarian Architecture* by Charlesworth, 2014, p: 33).

Another reason for neglecting the value of architecture is that there is a lack of knowing how to integrate architectural practice through the steps of disaster risk reduction. Hsieh Ying Chun also explains this issue:

“Our experience in reconstruction is based upon what we have learnt over many years in rebuilding houses after disasters (p: 32). (...) No architect's education touched on this matter. This subject requires contemplation of many issues, such as production, economics and culture. It takes much more than simply building a house” (in the book of *Humanitarian Architecture* by Charlesworth, 2014, p: 34).

That being said, the illustration of Glass (2008) shows that it is possible to merge the four steps of disaster risk management and the three core elements of architectural design within the practice of disaster-architecture, as shown in Figure 2.10.

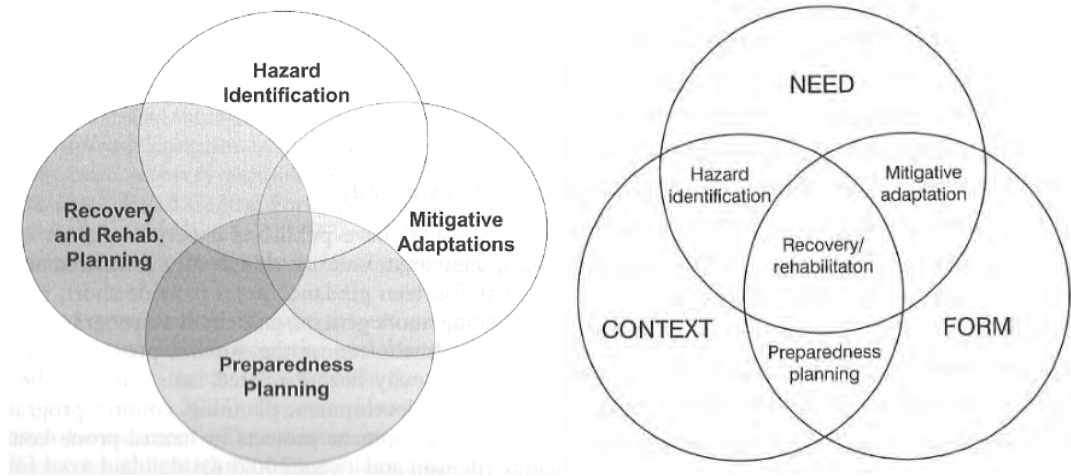


Figure 2.10 A general scheme of disaster risk management (Bosher, 2008) and the integration of the elements into architectural design steps (Glass, 2008).

2.1.5 Right to Adequate Housing

Disaster recovery aims to return affected communities to their normal routines (Lindell, 2013). Recovery of housing stock forms the greatest part of this process, and it has been deemed as an initiative to allow affected communities to recover (Gould, 2009). Barakat (2003, p. 1) underlines the meaning of housing for people:

“Housing is essential to the well-being and development of most societies. It is a complex asset, with links to livelihoods, health, education, security and social and family stability. Housing acts as a social centre for family and friends, a source of pride and cultural identity, and a resource of both political and economic importance. Housing is also an extremely vulnerable asset, and the destruction of homes or their loss through displacement or dispossession is one of the most visible effects of conflict and natural disaster”.

However, housing in terms of post-disaster reconstruction is often handled with a narrow focus on physical aspects (e.g. technical, materialistic and economic gauges). With such understanding, housing recovery is generally run through the programmes and projects developed by governmental authorities and the interest of third parties (i.e., contractors) from the private construction sector (UN, 2011). In addition, governmental authorities are inclined to take advantage of post-disaster conditions as political space in which they can easily impose their discourses and accelerate their developmental construction and land use plans as the conditions facilitate legalisation of the progress. This issue is more critical when a disaster takes place in politically marginalised areas (Pelling and Dill, 2008; Wilkinson, 2012). That is,

while the decisions and actions made within long-term disaster recovery plans can play a role in political centralisation or polarisation (Ozerdem and Jacoby, 2006), short-term recovery plans are generally made with the motto of ‘quick wins’ in the mind of political actors. Hence, the general perception is that rapid housing implementation and delivery to beneficiaries solve the need of disaster recovery (Rolnik, 2010, p: 12). However, as the flow of financial resources into reconstruction projects attracts the construction sector (Gould, 2009), with the pressure of the discussed beliefs, governmental authorities are prone to neglect monitoring contractors involved and ensuring the process is equitable for all since they are too focused on the delivery of houses (UN, 2011). Realisation of housing recovery in such manner not only neglects the essential aspects of adequate housing (UN, 2011) but also causes gaps in the promises made to beneficiaries and what they are delivered (WRC, 2011).

Adequate housing is declared by the International Covenant on Economic, Social and Cultural Rights (ICESCR)¹ as a right. That is, “adequate housing is thus not just a roof over one’s head” (Carver, 2011, p: 234); rather, it is “the right to live somewhere in security, peace and dignity” (UN, 2009, p: 3). A set of seven criteria given in Table 2.1 has been identified by the ICESCR as minimum requirements.

The right to adequate housing is strongly integrated with other human rights (Carver, 2011), as one can understand from the table. This integration overlaps the need to address the root causes underpinning the progression of vulnerability (Cannon, 1994; Wisner et al., 2004), which was explained in the beginning of the chapter. Hence, it can be concluded that adequate housing cannot be provided if the factors constructing vulnerability are isolated. In the words of Vatsa and Krimgold (2000, p: 130): “investment in disaster management (as housing recovery takes the large part of it) will not provide commensurate benefits unless it includes a corresponding emphasis on reducing vulnerability of the poor to natural disasters”.

In spite of this fact, most post-disaster housing reconstruction projects globally have been found lacking in terms of failing to meet the right to adequate housing as desired. Mainly, forced eviction without people’s will, lack of participation in decision-making, lack of access to the process (i.e., transparency), inequitable recognition of women’s higher vulnerability, and long periods of temporary accommodation are among the most widely mentioned violations of this right (Gould, 2009; Carver, 2011; UN, 2011). Thus, to establish a thoroughly integrated approach towards adequate housing, monitoring, participation, and intersectoral collaboration

¹ in General Comment No. 4 (Adopted on 13 December 1991, contained in Document E/1992/23).

are among the suggested key principles (Morka, n.d.). Since the context of the right to adequate housing and vulnerability overlap, methods of longitudinal evaluation are suggested as well. In this regard, Gould (2009, p: 186) clearly stated that “comparison of the community profile before and after the disaster is an important indicator of levels of achievement (...)”. Similarly, the importance of post-disaster need assessment as well as the identification of pre-disaster disparities and vulnerability factors has also been pointed out by the United Nations Special Rapporteur on adequate housing Raquel Rolnik² (UN, 2011). To conclude, developing an integrated approach towards the right to adequate housing is necessary not only to prevent violations of the right but also to increase the effectiveness of housing projects and recovery programmes.

Table 2.1 The seven criteria of the right to adequate housing and their clarifications, in words of the ICESCR (1992), UN (2009) and Carver (2011).

Legal security of tenure	To provide ‘legal protection against forced eviction, harassment and other threats’.
Availability of services, materials, facilities and infrastructure	To provide ‘the access to natural and common resources, safe drinking water, energy for cooking, heating and lighting, sanitation and washing facilities, means of food storage, refuse disposal, site drainage and emergency services’.
Affordability	To ensure that the cost of housing ‘commensurate with income levels’ of beneficiaries; in other words, not to ‘threaten or compromise the occupants’ enjoyment of other human rights’ just to afford housing..
Habitability	To provide habitable environment to beneficiaries ‘in terms of providing the inhabitants with adequate space and protecting them from cold, damp, heat, rain, wind or other threats to health, structural hazards, and disease vectors’.
Accessibility	To ensure that ‘adequate housing is accessible to those entitled to it (...) victims of natural disasters, people living in disaster-prone areas and other groups should be ensured some degree of priority consideration in the housing sphere. Both housing law and policy should take fully into account the special housing needs of these groups’.
Location	To ensure that adequate housing must be in a location which allows access to employment options, health-care services, schools, childcare centres and other social facilities.
Cultural adequacy	To ensure that ‘the way housing is constructed, the building materials used and the policies supporting these must appropriately enable the expression of cultural identity and diversity of housing’.

² Rolnik is an architect and urban planner based in Sao Paolo in Brazil. Since June 2014, the rapporteur is Leilani Farha, who is a lawyer, based in Ottawa in Canada (available at: <http://www.ohchr.org/EN/Issues/Housing/Pages/HousingIndex.aspx>).

2.2 Earthquakes as natural hazards

Naturally occurring geological and hydro-meteorological processes in the Earth become potential threats for society when they strike the built environment, and are then called natural hazards. If a hazard cause massive impacts, including devastation of the built environment, casualties, social trauma, financial losses, and, as a whole, significant disruption in societies' everyday processes, they are called natural disasters (Wisner et al., 2004; Bosher, 2008; Hyndman and Hyndman, 2012). Despite the natural occurrence of hazards, disastrous results are linked to human-based factors, mainly led by socio-demographic characteristics of populations that push them to create susceptible human settlements (Mileti, 1999; Pelling, 2003; MOVE, 2011) as in the concept of vulnerability explained earlier.

2.2.1 Significance of Earthquakes

Earthquakes are the most disastrous natural hazard since they are sudden yet unpredictable despite the contemporary technological advances, and often trigger tsunamis or tidal waves, landslides, and even volcanic eruptions, or aftershocks following the main shock (Sinthal, 2010; Hyndman and Hyndman, 2012; IFRC, n.d.). The dynamics of earthquakes are complicated, and the predictions of earthquakes are unlikely to happen (Snieder and Eck, 1997). Booth and Key (2006, p: 21) provide a clear explanation of the mechanism resulting in an earthquake:

“Earthquakes arise due to forces within the earth’s crust tending to displace one mass of rock relative to another. When these forces reach a critical level, failure in the rock occurs at points of weakness called fault planes and a sudden movement occurs, which gives rise to violent motions at the earth’s surface”.

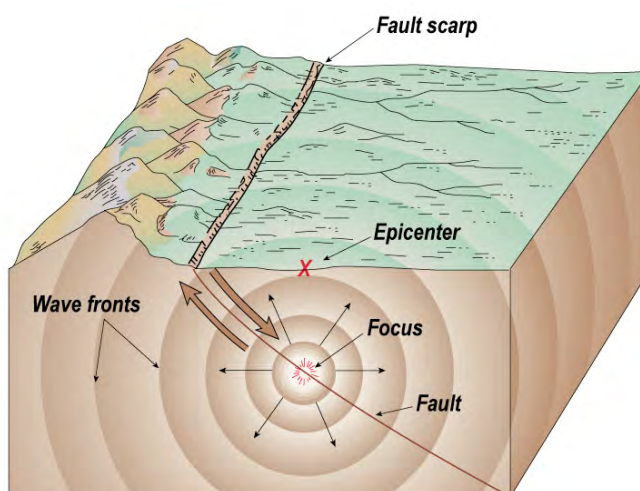


Figure 2.11 A cross-section illustration of an earthquake (Source: <http://clasfaculty.ucdenver.edu/callen/1202/Battle/Build/Faulting/EQCrossSection.jpg>).

The *focus* is where the failure starts and the *epicentre* is where the focal depth ends on the earth surface. In strong earthquakes the fault where the failure takes place generally becomes visible on the surface, is called a fault scarp. From the focus, the failure releases energy outward that produces seismic waves spreading in the impact zone of earthquake. Figure 2.11 illustrates this mechanism. The severity of earthquakes is described by either intensity (i.e., Mercalli) or magnitude (i.e., Richter). While intensity is more observational and based on the effects on people and buildings, magnitude is an empirical scale that is measured by seismographs. This instrument calculates three magnitude values that slightly differ from each other: M_s is surface-wave magnitude –the most commonly used value, M_w is moment magnitude, and M_L is local magnitude (Booth and Key, 2006; Hyndman and Hyndman, 2012).

It is assumed that millions of ground shakings occur each year globally, but most remain undetected due to their epicentral distances to observatory destinations or because they have lower magnitudes than the ranges set to be recorded. Nearly 20,000 earthquakes a year recorded in databases results in an average of 50 earthquakes per day. Based on historical earthquake catalogues, it is normally expected that 15 severe earthquakes with magnitudes between 7.0 and 7.9 M_w , and one highly severe earthquake with magnitude over 8.0 M_w occur each year (USGS, n.d.). Table 2.2 shows the estimation of the earthquake occurrences.

Table 2.2 The average annual occurrence of earthquakes (USGS, n.d.).

Magnitude	8 and higher	7 - 7.9	6 - 6.9	5 - 5.9	4 - 4.9	3 - 3.9	2 - 2.9
Average Annually	1 ¹	15 ¹	134 ²	1319 ²	13,000 (estimated)	130,000 (estimated)	1,300,000 (estimated)
¹ Based on observations since 1900.							
² Based on observations since 1990.							

Studies have also emphasised the increasing global trend of the occurrences of damaging earthquakes in terms of causing large numbers of deaths, injuries, homeless people, displacement of survivors, and destroyed building stock (Gutierrez et al., 2005; Daniel et al., 2011; Daniel and Vervaeck, 2012; Doocy et al., 2013). While natural disasters are generally viewed as an issue for underdeveloped and developing countries, specifically due to their rapid population growth that puts more people under risk of exposure (United Nations ISDR, 2004), statistics reveal that disasters have also begun to violate developed countries. Daniell et al. (2011) revealed that countries with high Human Development Index values have begun to experience damaging earthquakes particularly after 1985. The earthquakes of Kobe (1995) and Tohoku (2011) in Japan, of Northridge, California in the United States, (1994), of Christchurch

in New Zealand (2011), and of L'Aquila in Italy (2009) strengthen this point (Fig. 2.12). In addition, between 2000 and 2008, earthquakes caused 58.7% of the total life losses due to natural disasters in the world. The share reached its highest in 2011 at 68.1%. EM-DAT statistics also prove that each year, 7,000 to 8,000 people lose their lives due to earthquakes (Vos et al., 2010; Guha-Sapir et al., 2012; Guha-Sapir et al., 2013). Doocy et al. (2013) focused on the three decades between 1980 and 2009 and estimated that at least 16 million people became homeless as a result of 953 earthquakes. Their results also revealed that a majority of deaths were caused by building collapses, which was also associated with the development levels of countries through the quality of construction and socio-economic status of people.

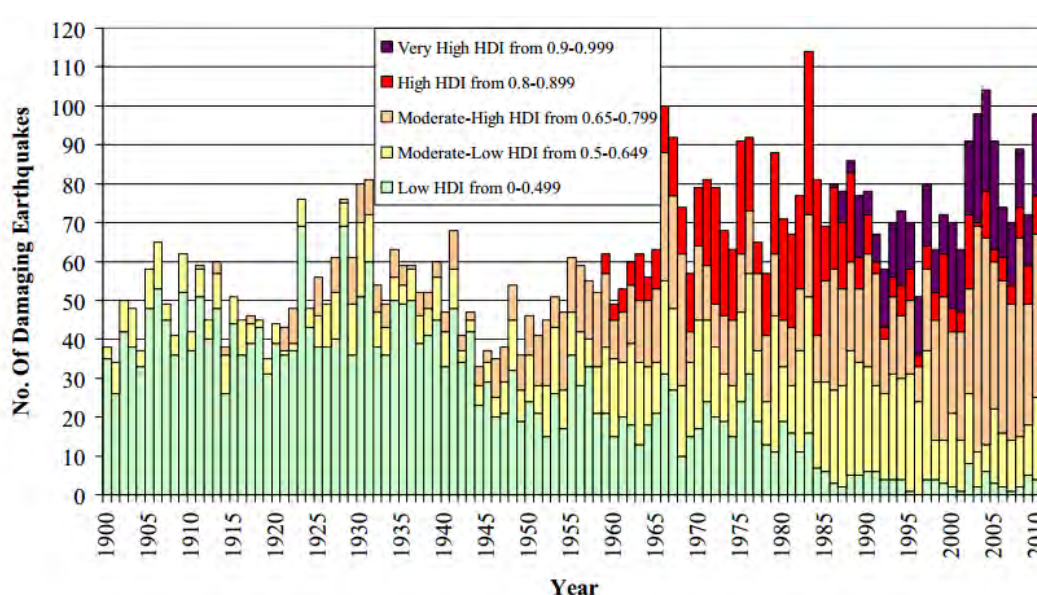


Figure 2.12 Based on the CATDAT, the number of damaging earthquakes in relation to the HDI level of countries between the years of 1900 and April 2011 (Daniell et al., 2011).

2.2.2 Vulnerability of rural areas

The combination of low socio-economic development and high magnitude earthquakes inevitably causes enormous destruction in the built environment resulting with large numbers of deaths and injuries (Doocy et al., 2013). More clearly, the widespread and severe damages after earthquakes in most developing countries are the result of vulnerable housing (So, 2011). The type of structural materials and systems, the quality of workmanship, and the building codes are criticised in the case of earthquakes. In this context, if the building stock has a large proportion of unreinforced masonry structures built with stone, adobe, and clay bricks, and constructed by unskilled people, then the built environment is generally deemed vulnerable due to proneness to total collapse and potential cause to high mortality (Coburn, 1993; Gutierrez et al., 2005; Jigyasu, 2008; Korkmaz et al., 2010; Daniell and VerVaack, 2012).

For example, a study (Liao et al., 2005) on the 1999 earthquake in Chi-Chi, Taiwan, revealed that the collapse of unreinforced masonry buildings caused a mortality rate six times higher than that for collapse of RC buildings. The study concluded that this type of masonry buildings was more prone to total collapse rather than partial collapse or to remaining standing with moderate damage, thereby increasing the number of deaths. Tsai et al., (2000) found that of over 4,000 RC buildings, 15% totally collapsed and 23% suffered heavy damage, whereas of over 2,000 unreinforced adobe brick buildings, 38% totally collapsed and 25% suffered heavy damage, and of over 1,000 unreinforced mud brick buildings, 76% totally collapsed.

Kuwata et al.'s (2005) study on the 2003 Bam earthquake in Iran emphasised that half of the life losses were caused by the collapse of adobe and clay brick masonry buildings which were mostly houses. In other types of structures, the numbers of people who injured or survived was higher than the number of deaths. Manafpour (2003) highlights that the practice of building unreinforced masonry structures has been largely replaced with industrialised materials in rural areas and villages though the practice remains mostly the same or without the necessary detailing. He also emphasised the impact differences between the Bam (6.6 M_w) earthquake, where more than 25,000 died and 75,000 became homeless, and the San Simeon (6.5 M_w) earthquake in California, where only two people died (CSSC, 2004).

Similarly, in the 2005 Kashmir earthquake (7.6 M_w) in Pakistan, where over 73,000 died, unreinforced masonry buildings built from rubble stone and very poor quality of mortar were the cause of deaths in villages, as this type of building formed 75% of the building stock in these locations but only 15% in urban areas (Spence and So, 2009). The report of ADB and WB (2005) highlighted that the earthquake flattened almost all of the mountainous and scattered villages that already lacked of infrastructure (e.g., clean water and waste disposal).

In the 2007 Pisco earthquake (8.0 M_w) in Peru, nearly 600 died and 80% of the adobe and mud brick masonry building stock collapsed. It was reported that the people in rural areas, highly suffered from poverty, were attempting to use salvaged materials from the ruined masonry buildings (Spence and So, 2009). Unreinforced masonry is one of the oldest building methods for housing. However, it is highly brittle even to light shocks (Blondet et al., 2011). Figure 2.13 provides examples of the buildings suffered heavy damage in earthquakes. The examples also highlight that these types of buildings are no longer favoured, except in remote and scattered rural settlements globally. This is the result of the characteristic formation of rural populations, particularly in developing countries and is the result of increasing vulnerability.



A collapsed stone masonry house, Kashmir, Pakistan (EERI, 2005)



A totally collapsed adobe masonry building, Bam, Iran (Manafpour, 2008).



A collapsed adobe brick masonry house, Van, Turkey (EERI, 2012).

Figure 2.13 Examples of heavily damaged and collapsed unreinforced masonry buildings.

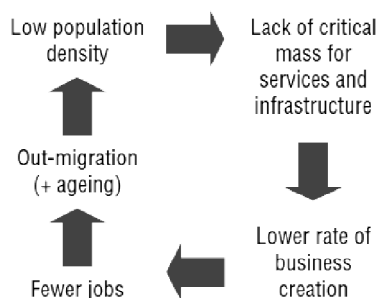


Figure 2.14 The chain of drawbacks that rural areas suffer (OECD, 2006).

Today, rural populations are confronting the issue of ageing as the result of younger generations' out-migration. Even in countries such as Japan, Spain, and France, this problem is extremely visible. Migration is generally the result of higher education attainment and seeking better and more diverse jobs in labour market in urban areas, which attract younger generations, in turn, leaving rural settlements to the elderly. As a further result, settlements in rural areas lose population and turn into remote and scattered settlements. They are generally left without sufficient infrastructure and public service as there is lack of interest in developing plans and creating business (Fig. 2.14). All of these disadvantages cause rural people to suffer poverty, which constructs the economic boundaries that push people to build and live in poor quality housing, such as in the examples given, since they cannot afford anything better. Today, therefore, poverty and vulnerability are the most encompassing words used to refer the disadvantageousness of rural areas; in the word of Sabates-Wheeler et al., (2008, p: 4): "Rural poverty and vulnerability reinforce each other". Finally, rural settlements and populations are considered far more vulnerable since they are more prone to suffer when exposed to impacts of disasters (e.g., higher ratio of potential victims among the local population (Cross, 2001).

2.3 Post-earthquake reconstruction examples

Have discussed the theoretical perspective to disasters and the challenges in rural areas and their vulnerability, now the examples of post-earthquake housing reconstruction projects implemented in the affected rural areas of India, China, Italy, and Japan are reviewed to link the discussion. These are chosen as examples because they are among the countries most frequently exposed to earthquakes and represent different levels of development. Extending the literature review with the examples of post-earthquake housing reconstruction serves to explore how the theoretically preferred approaches and the real-life implementations differ at addressing the needs of rural communities and rebuilding their settlements. This part of the review also serves a comparison with the case studies of Turkey examined in Chapter 5.

2.3.1 India (26th January 2001, the Gujarat earthquake)

Nearly 30% of India is classified as under risk of severe earthquakes, and 26% is under risk of moderate earthquakes (Khan, 1999). The Gujarat earthquake struck the northwest of the country with magnitude 7.9 M. Over 20,000 died and nearly one million became homeless as the earthquake affected over 7,900 villages and the populated adjacent towns (Eidinger, 2001; Jain et al., 2001; Buchanan and Solanki, 2011). Most of the deaths were caused by the collapse of rubble stone masonry buildings in village settlements³ (Ballantyne, 2001). Although 69% of deaths were in urban areas, the devastated rural areas were far larger and the ratio of collapse in most villages reached 95% (Murakami, 2001).

The central government established the Gujarat State Disaster Management Authority to facilitate a local-based reconstruction process (Thiruppugazh, 2014) and the Gujarat Earthquake Emergency and Rehabilitation Programme, which was largely sponsored by the WB and the ADB (UNNATI, 2006). They strongly suggested reconstruction in-situ with an owner-driven approach instead of involving contractors and relocating people if there were no risk factors urging the relocation (Joint Report, 2001). Accordingly, relocation was promoted only for villages with a collapse ratio above 70% (Murakami, 2001). The survivors were encouraged to build houses on their own with the help provided; as a result, 87% of the total housing units were completed through this approach and 75 organisations were involved in the full reconstruction of 272 villages in Gujarat (Barenstein, 2006). The entire reconstruction of the area was completed in two years (UNNATI, 2006).

Governmental financial assistance for reconstruction varied according to the type and size of the house selected to be built by the owner (from \$650 to \$1,500). The help was released in three parts: the first 40% was given at the beginning of the work; the second was given when the builder completed the walls and roof, and the last 20% was given at completion. Damage assessment surveys were used to identify the beneficiaries. Experts, mostly civil engineers, were assigned to each village to control the reconstruction (Barenstein, 2006).

Barenstein (2006) surveyed 136 villagers who built houses on their own with the government's help and found that 95% were strongly satisfied with their houses. Most villagers were also satisfied with the amount of the help they received, and the villagers that were allocated the minimum help gave the highest score of satisfaction. This result was interpreted as the value of

³ The traditional permanent housing, *Pecca*, which is built with brick or stone masonry and mud mortar, and the temporary shelter type, *Kachcha*, which is built with bamboo and mud walls and thatch for roofing, were damaged severely by the shock and caused life losses (Murakami, 2001).

their previous houses was very low and even with such small amount of help, people were able to create better housing conditions. They also were also strongly satisfied with the quality of the materials they used in the construction. A similar finding⁴ was also pointed to by Sanderson et al. (2011).

A contractor-driven approach was mainly preferred by organisations, and the houses were built as RC frame structures with concrete block masonry walls and a terrace roof. Contractors used their own workers, and three different size of house were developed (25 m², 34.5 m², and 37 m²)⁵ (Barenstein, 2006). Barenstein and Iyengar (2010) highly criticised the forced use of RC buildings, which are not appropriate due to demands such as the use of water in arid soil and climatic conditions. Sanderson et al. (2011) surveyed 10 villages and found that the villagers most commonly complained of the leaking flat roofs. Ventilation and over-heating were also mentioned by the dwellers.

According to Barenstein (2006), the size of the houses were also indicative of satisfaction level as the dwellers that built houses on their own were far more satisfied than dwellers whose houses were built by contractors since these were smaller (Fig. 2.15). In this context, Sanderson et al. (2011) noted that some dwellers added external stairs to make the use of the flat roof, and some added an external toilet. One dweller was reported that he had to sleep outside since his daughter, her husband, and their two children slept inside the house. Another dweller built a shed for cooking that he also used for sleeping. In addition, they noted one exceptional case where a dweller in good economic condition bought his neighbour's house and united the two houses.

Barenstein (2006) also surveyed a contractor-built village with 799 houses and found that 72% were satisfied with their houses, but only 64% were satisfied with the quality of the material used. Some villagers noted that they liked the houses since they could add an extra floor by covering the terrace roof. However, the quality of doors and windows did not satisfy the beneficiaries. A number of houses built with this approach were unoccupied. It was reported that some villagers wanted to have their new houses built on their own farmland, but this request was ignored by the contractor, which was pointed at as the likely reason for the unoccupied houses.

⁴ One female participant's words quoted exemplifies the general view of those surveyed, "*We do not have any money to change the house; we cannot even mend the broken window. But we like the house and it is better than what we lived in before*" (Sanderson et al., 2011, p. 7).

⁵ The funds allocated to the beneficiaries covered only the minimum size of house; hence, the dwellers that preferred larger options had to pay the extra amount to the contractor (Barenstein, 2006).

Three villages relocated to a new site with a total of 719 dwellings built with the contractor-driven approach were also surveyed by Barenstein (2006), and dissatisfaction among the villagers was found to be as high as 65% regarding the quality of the materials used and 95% regarding overall construction quality. The beneficiaries' complaints were concentrated on the irrelevancy of the design of the houses for rural life (e.g., no additional unit for livestock and no privacy considerations for households). Barenstein noted that in one of the 23 relocated villages, the occupancy rate was as low as 25%.



Figure 2.15: View of a 30 m² house (Sanderson et al., 2011) and an unoccupied contractor-built house on a relocated site (Barenstein, 2012).

Moti Chirai village was one of the largest and was also relocated. However, it was noted that the villagers did not like the grid-pattern of the settlement layout. Almost every house was surrounded by a fence or solid wall due to privacy and security concerns (Fig. 2.16). In one village, the surveyors noted three houses were sold to new owners (Sanderson et al., 2011).



Figure 2.16 Mora Chirai village under construction (on the left) and the village road view (on the right) (Sanderson et al., 2011).

Lakhapar village was noted as having the lowest occupation rate, and most dwellers mentioned that they had rebuilt houses in their former locations. The dwellers' perceptions regarding the earthquake resistance of the houses varied as some found them robust due to the use of

concrete blocks, and some found them completely insufficient, referring to the amount of mortar used and the lack of design of columns. Some dwellers were concerned about cracks in walls. For that reason, for example, in Nilpar village, some villagers began using their houses as storage instead of for sleeping (Sanderson et al., 2011).

A study of Hajapar village (Fig. 2.17), with 720 inhabitants, found that 15% were living in temporary shelters after five years, and only 40% of houses which were built by hired contractors at a relocated site were occupied. It was also noted that in Bitta village, which had over 1,000 inhabitants and was rebuilt through owner-driven approach, more than 30% of the houses, were classified vulnerable (Samaddar and Okada, 2006). Jigyasu (2002) noted that the people settled in new houses had little awareness of the meaning of earthquake resistant construction techniques. Similarly, Sanderson et al., (2011) found that the dwellers were not aware of the significance of ring beams.

Having to make a choice between contractor-driven and owner-driven approaches caused a divide in villages in a few cases. For example, in Vondh village in Bhachau, half of the villagers chose the contractor-driven approach sponsored by the Maharashtra government, and their houses were built at a relocated site three km from the original location of the village whereas the remaining villagers preferred building houses on their own in the same place as their former houses. Hence, the village was divided into two parts, and the relocated settlement was left largely unoccupied, with some houses used as storage or livestock sheds (Sanderson and Sharma, 2008).



Figure 2.17 The satellite observation of Hajapar, the implementations constructed beside the former settlement (Google Earth, 2013).

2.3.2 China (12th May 2008, the Wenchuan earthquake)

China is highly seismically active, and 60% of its lands are classified as under risk of severe earthquakes, 90% of the under risk areas classified rural (Chu et al., 2013). The Wenchuan earthquake had magnitude 7.9 M_w and was the most deadly and devastating disaster since the 1976 Tangshan earthquake (USGS, 2012). Casualties were over 87,000 and nearly 12 million people homeless (IFRC & RCS, 2009; Yaoxian, 2012; Hao, 2013; Wu et al., 2013). The areas affected were largely rural, and 78% of the population affected were solely dependent upon agriculture (Shelter Projects, 2009). Four months after the earthquake, the government initiated a programme for reconstruction, and, in three years, the completion was officially announced (Wu et al., 2013).

The argument of ‘the window of opportunity’ was also made for the Wenchuan earthquake interventions as Abramson and Qi (2011) highlighted the antecedent policies of the government regarding the transformation of rural areas⁶. They strongly criticised the interpretation of urban-rural integration policy as “the straightforward extension of urban standards of living to rural residents” (p. 508), and emphasised the physical scope of rural housing, which increased the density of settlements and replaced the layout of villages with detached houses in large yards by attached houses in small yards.

Nevertheless, with the government’s joint reconstruction and rural land use policies, villagers could have their houses rebuilt with no cost if they agreed to leave some part of their land to urban entrepreneurs. In Chaping village, a hog breeder had his house built by a customer who sponsored reconstruction of the 232 m² two-storey house. Such an approach to reconstruction was necessary according to local authorities since there was a shortage in government sources. Furthermore, the villager’s words⁷ imply that the approach was very welcomed by the community despite the fact that they had to renounce some of their land (Lin, 2009). In Qipan village, the houses were rebuilt with two-storey and a quite modern look (Fig. 2.18). An older villager’s words⁸ quoted in a web reference imply that the villagers were quite happy with the implementations (Jin, 2010).

⁶ The three particular movements that the authors highlight are the “three rural problems” (farmers’ poverty, backwardness of rural life, and agricultural crisis), the “Socialist New Village Construction”, and the “urban-rural integration” (Abramson and Qi, 2011, p. 506).

⁷ “I wouldn’t be able to afford to build such a house in 10 years, but now, without paying anything, I’m living in a villa” (Lin, 2009).

⁸ “It’s like a dream to live in such a house. Even though I was well-off, I didn’t live in a house like this. The house is modern and facilitated with water, electricity and gas. With these, I can lead a modern life” (Jin, 2010).



Figure 2.18: View from the entrances of houses built in Qipan village (50 Internet Media, 2009).

There are also reconstruction examples that illustrate that the dominance of central government was softened with the collaboration of academic and research institutes, international civil societies, and non-profit organisations, some of which also donated implementations (Chinese Academy of Social Sciences, 2011). For example, in addition to low-cost as the main concern for most implementations, sustainability (e.g., Da Ping) and strong cultural preservation (e.g., Laode Nian Hua) were thematic approaches to reconstruction, which are outlined in Table 2.3.

Table 2.3 Highlights of the reconstruction of Da Ping and Laode Nian-Hua villages.

Da Ping Village, Sichuan Province

The reconstruction of the village, with over 200 residential units, was coordinated by the Green Building Research Centre of the Xi'an University of Architecture and Technology. Sustainability was the core theme to create a built environment in harmony with the culture of local community and the local environmental conditions and to minimise energy consumption. Locally available wood and bamboo were the structural materials used to build the frame houses along with secondary materials saved from the damaged houses. Using local materials enabled the villagers to participate in construction, which helped to decrease housing costs to an estimated \$76 per m². Each residence was planned with a modular system and with respect to household size.

Laode Nian-Hua Village, Mianzhu province

The village has a background of Nian-Hua, a Chinese illustration art over 2,000 years old. The reconstruction of the houses aimed to use the traditional architectural practices of south China, and, with respect to the illustration art, each house was marked with an example of Nian-Hua caricature illustration. A 93-year old Nian-Hua master, also a resident in the village, was given a studio with a small shop to continue his work and expand it as a business, which, in turn, provided a good income source for his family as well. Despite the low population of the village, of only about 100 houses, it has become a tourist attraction point and offers a variety of jobs to residents.

The Qiang are an ethnic population with strong cultural and architectural identity. Therefore, reconstruction of the Qiang villages aimed to maintain their cultural and architectural heritage (Abramson and Qi, 2011; Bei, 2011). In this regard, the reconstruction of Yang Liu village was significant as it was the product of deliberate collaboration between the architect, the villagers, and the academy. The village, with 72 house and 357 inhabitants, was relocated since its location was in a landslide-prone area (Xiao, 2013). The reconstruction was carried out by Tsinghua University, and a non-profit organisation sponsored the reconstruction (Narada Foundation, 2014). The houses were designed by award-winning Taiwanese architect Hsieh Ying-Chun as three-storey light-steel frame structures (Fig. 2.19). The light-steel frame components were erected by skilled workers and infill masonry walls were completed by the villagers (Archnet, 2010). Each house accommodates six people on average (Raskin, 2012) with an approximate 167 m² area (Archnet, 2010).



Figure 2.19 Settlement of Yang Liu village and a view of a house (Raskin, 2012; Archnet, 2010).

However, not all examples of the reconstruction are as good as in Yangliu. For example, in Pingtuo village, the houses were rebuilt as RC structures with stone covering only on the facades to copy the traditional look. Hence, some houses were found suffering from severe damp (Fig. 2.20).



Figure 2.20 View of a Qiang house built in Pingtuo village (Aba Maoxian Department of Tourism, 2010) and the damp inside (Sheng, 2014).

Not all villages were reconstructed in an attempt to recreate traditional building practices. For example, in Yingxiu Township of Wenshuan County, the village houses were built as brick masonry (Fig. 2.21) and each family was given the opportunity to choose a model out of three options that differed on the number of rooms (IRP, 2010).



Figure 2.21 View of brick masonry houses built after the Wenchuan earthquake, some of which were fully donated by the IFRC (Shelter Projects, 2009).

It was reported that the implementations in Tien Sheng Qiao village were uninhabited since 160 people left their rebuilt houses empty and continued living in their temporary shelters. This was linked to the irrelevancy of the design of houses with the villagers' life. An insufficient amount of private land was allocated for the villagers' livestock, and the villagers were forced to use a communal cooking area and toilets located far from the implementations. The reference mentions a villager who left after living only 10 days in the new house (Sichuan Quake Relief, 2009b).

The government allocated loans according to the income level of householders and based on the damage to their houses (Sichuan Quake Relief, 2009c). However, the allocation scheme was not responsive for all as some villagers needed bank loans since the implementations were not funded under any other organisational scheme. For example, in Yanyan village, the cost of a house was about \$6,500, but the government partially sponsored an amount that ranged from \$2,500 to \$3,500. This caused most families to take out bank loans, but some preferred to leave the interior of their house incomplete. Furthermore, unlike the previous layout of the settlement, the new houses were reconstructed along the village road as two-storey timber frames with masonry brick walls (Fig. 2.22). No insulation layer was applied to reduce heating costs. However, the new layout caused a decrease in the private land of families, and some had to keep their farmland and livestock at a distance from the village (Sichuan Quake Relief, 2009a).



Figure 2.22 View from the village road of Yanyan and an example of a house under construction (Sichuan Quake Relief, 2009a).

In contrast, nearly 22,500 of the most vulnerable households from the rural settlements of Mianzhu County were covered by the IF programme, which adopted an owner-driven approach for the reconstruction. Further, the IF teams trained thousands of beneficiaries to enable them to diversify their source of income (IFRC & RCS, 2009). Yaojin village is an example of donation where an international humanitarian organisation completed 54 houses in ten months with the support of Operation Blessing International (OBI) (Guanqun, 2009).

A programme in cooperation with UNDP and the local councils was initiated for capacity building and poverty alleviation in 19 villages of Sichuan, Gansu, and Shaanxi provinces. Interviews conducted in the villages after the programme by Beijing Normal University and Texas A&M University revealed that 89% of villagers were satisfied with the overall progress, and 98% were satisfied with the quality of the reconstruction. Nearly 98% stated they recovered their livelihood to a pre-earthquake level, and nearly 90% agreed on that they felt safer in their newly built houses (IRP, 2010).

A survey by Chinese and Norwegian institutes found that 6% of the beneficiaries who had taken bank loans to complete their houses were certain on that they would never be able to repay them. They also reported that despite the government's attempts to combine redevelopment plans with post-earthquake recovery and reconstruction progress, social and level-of-income disparities re-emerged after three years as the most severely affected households were still struggling to recover by then. Their results showed that families with different sources of income were in better economic condition than families with only agricultural sources of income (Dalen et al., 2012). A study also evaluated the poverty-based vulnerability of rural households before and after the earthquake and found that households who farmed part-time and non-farmer households were significantly less vulnerable than farming dependent households (Sun et al., 2010).

2.3.3 Italy (6th April 2009, the L'Aquila earthquake)

Italy is one of the most earthquake-prone European countries and has been deemed highly vulnerable given the character of the built environment. Severe ($6.0 < M_s$) and destructive earthquakes generally occur in central and southern Italy (Slejko et al., 1999; Romeo and Pugliese, 2000; Romeo et al., 2000). In 2009, an earthquake struck the central Italy with magnitude 6.3 M_w (5.8 M_L) (Celebi et al., 2010; Augenti and Parisi, 2010) and caused over 300 deaths, left 67,000 homeless and 18,000 buildings suffered heavy damage. The earthquake was the most deadly since the 1980 Irpina earthquake, which struck with magnitude 6.9 M_L and caused approximately 2,900 deaths (Augenti and Parisi, 2010; Longhini, 2013).

The collapses of old masonry structures in the surrounding villages increased the extent of devastation, which is the reason why Italy is vulnerable to earthquakes. Augenti and Parisi (2010) stated that despite the damages most masonry buildings suffered, masonry buildings built with larger stones performed better than other types of masonry buildings. For example, in Poggio Pienze village, the rubble stone masonry buildings were remarkably damaged (Fig. 2.23) whereas the shaped stone masonry buildings were relatively less damaged (Lanzo et al., 2010). Furthermore, Lanzo et al., (2010) and Augenti and Parisi (2010) emphasised the soil characteristics of Onna, Paganica, and Castelnuovo villages as they were the most severely damaged, whereas no severe damage was observed in the surrounding villages Barisciano and Monticchio.

In the first year after the disaster, the only construction work carried out was the repair of buildings with light damage. Even the ruins of most collapsed buildings remained untouched (Alexander, 2011). Contreras et al. (2014) associated the slow progress of post-earthquake reconstruction of the city with poor waste management and debris removal. The survivors were temporarily sheltered in tents for the first six to seven months and then provided transitional housing units (Alexander, 2011). CASE⁹ was a project developed for affected populated areas, and was approved only 22 days after the earthquake (Fois and Forino, 2014). The CASE houses were built with two or three storeys and with timber or steel frames on reinforced concrete foundations with seismic base isolators. The houses under this project were built in 19 sites and provided home for 15,000 people. MAP¹⁰ was a housing project for the rural and less populated areas surrounding L'Aquila. In about 50 sites, houses were built to settle 8,000 people. However, both projects received extreme criticism from Alexander (2010,

⁹ Complessi Antisismici Sostenibili ed Ecocompatibili.

¹⁰ Moduli Abitativi Provvisori.

p: 63) as he stated: “The CASE and MAP projects represent the latest evolution and most extravagant form of the prefabricated post-disaster transitional dwelling”. Furthermore, the locations of temporary shelters and transitional houses were also found to be inappropriate since some were in flood-prone areas, some were farmland, and most were isolated from public services (Alexander, 2011). The interviews Liel et al. (2012) conducted in Onna, Poggio Picenze, and the centre of L’Aquila revealed that the dwellers in the CASE and MAP projects complained that the cost of these projects was equivalent to the cost of proper reconstruction. Notwithstanding, they were highly satisfied with living in the buildings as they relied on the earthquake-resistance of the buildings. Fois and Forino (2014) raised the different issue that in the future, these implementations may turn into peripheral areas invading rural agricultural areas.

Planning and implementing post-disaster transitional houses may take several months in developed countries, while it often takes only few days or weeks in developing countries, which results in visible difference in the quality of the work. Regarding the implementations in L’Aquila, while the sufficiency of funds and availability of expertise were not lacking, the commitment of the government and the participation of the people affected were widely evaluated as lacking and were thus criticised (Contreras et al., 2013). In terms of disaster-politics discourses, Alexander (2011) argued that the leading government at that time paid attention and cared about the situation until the elections in early June 2009, and then, after they won, the struggles in disaster recovery were not brought to any acceptable solution since the political benefits were already accomplished.



Figure 2.23 A totally collapsed unreinforced stone masonry building in Castelnuovo village (Lanzo et al., 2010).

Becoming homeless after a disaster leaves people desperate and often triggers or accelerates migration patterns as what occurred in Italy after the L'Aquila earthquake. In detail, by the end of 2009, over 24,000 job opportunities were affected, and people in the area migrated out rapidly (Alexander, 2013). Lunghoni (2013, p: 14) made a similar point almost four years after, stating: "(...) since the mainstream Italian media have always spread the message that the city has been rebuilt. Unfortunately, evidences prove that L'Aquila is still destroyed and abandoned". Contreras et al. (2013) also stated that the recovery in L'Aquila was not completed successfully as the relocation of people from hazardous areas to safer areas with earthquake-resistant buildings cannot be deemed as the entire premise of recovery. Trivelli et al. (2012, p: 970) claimed that the implementations of the CASE program "are actually permanent dwelling with a lack of flexibility and reuse, all without a program for the future". About the MAP implementations, he stated: "MAPs are basically transitional shelter which the stage of de-construction is not designed nor planned". Figure 2.25 provides examples of the MAP projects implemented in the villages of Poggio Pienze, Onna, Scoppito, and Monticchio.

In contrast, in Pescamaggiore village, seven houses were built within the scope of sustainability and low-cost. The village is very small with a population of 40 to 45 and is mostly elderly. The preliminary solution was to relocate villagers into one of the CASE blocks. However, the relocation was about 8 km away, and the villagers were against leaving their village and losing a sense of community. Hence, the EVA¹¹ project was developed (Fois and Forino, 2014). The houses were built as timber post-and-beam structures with straw infill walls and cement plaster on the surface (Fig. 2.24).



Figure 2.24 View of the straw infill in walls of a timber post-and-beam structure (Source: <https://www.flickr.com/photos/41833955@N07/with/5062866349/>) and a view of completed houses (Lisi, 2011).

¹¹ Eco Villaggio Autocostruito.



The M.AP project implemented at the skirt of the Poggio Pienze village (Street view, May 2011, via Google Earth).



The M.AP project completed in Onna village (Street view, May 2011, via Google Earth).



View of the settlement at the skirt of the mountain (Ware, 2013).



The two-storey blocks built in Monticchio village (Street view, May 2011, via Google Earth).

Figure 2.25 Examples of the MAP houses developed.

2.3.4 Japan (11th March 2011, the Tohoku earthquake)

The Tohoku earthquake was the most severe in the history of Japan as it struck with magnitude 9.0 M in the northeast of the country. It lasted for about four minutes and triggered tsunamis of 8 metres that hit the coast of Sendai (The Earth Observatory, 2011). Japan is the most frequently exposed country to earthquakes, and it is also deemed the best prepared in the world. However, the earthquake exceeded estimations for the area, which was 8.2 M maximum. A few aftershocks above 7 M followed the main shock; hence, the earthquake caused a massive disaster as it also caused leaks in the Fukushima nuclear plant. Inundated inlands measured about 500 km² and 600,000 of people living in the area were affected. Notwithstanding, compared to a similar disaster – the Indian Ocean earthquake and tsunami in 2004 – experts estimated that the preparedness of Japan reduced the death toll around 80-90%. The disaster killed 15,000 people and over 130,000 were displaced (EEFIT, 2012).

With the experience of the 1891 Nobi earthquake, unreinforced masonry buildings are strictly banned in most areas of the country. Single family houses are generally built as one- or two-storey timber frame structures. Besides the traditional forms¹², since the 1970s, prefabricated timber has been popular for this kind of family housing. Multi-family houses are generally built as multi-storey RC or steel frame structures (EEFIT, 2011; Chian et al., 2012).

Although the devastation the disaster caused was the collective result of the earthquake and the following tsunami, timber frame buildings suffered heavy damage, steel frame buildings suffered light to heavy damage, and RC frame buildings generally suffered light damage (Hando and Fujita, 2011). Over 130,000 residential buildings collapsed, and over 250,000 partially collapsed (IRP, 2013). Some timber buildings were not affected by the earthquake but were damaged by the impact of the tsunami, while some suffered due to the earthquake-induced liquefaction (Figure 2.26).

The government established the Reconstruction Design Council as a specific governmental branch in April 2011 (EEFIT, 2011) and, in February 2012, established the Reconstruction Agency to begin long-term implementations (IRP, 2013). Nevertheless, there were survivors still waiting for permanent housing implementations even three years after the disaster (Iuchi et al., 2015).

¹² One is *shinkabe*, is built with large bamboo lattice walls filled with mud, and the other is *okabe*, which is built as braced timber lathes. These types of timber houses are not fire proof and, due to having heavy tiles for roofing (against the risk of typhoons) along with large openings in interior walls, the houses are not deemed seismic resistant (EEFIT, 2011).



Figure 2.26 Wooden houses still standing but damaged by the tsunami (Koshihara et al., 2012); a residential building that suffered liquefaction (Hando and Fujita, 2011)

The entire reconstruction was scheduled to be finished within 10 years after the disaster, of which the first five years would occur rapidly (Okuda and Ohashi, 2012). Until the completion of the permanent housing implementations, some survivors were allocated temporary shelters (Fig. 2.27) and some were provided transitional shelters (Alexander, 2014). However, given the triple-disaster, the progress of reconstruction and recovery was much slower compared to previous experiences like the Kobe earthquake in 1995, with magnitude of 7.2 M that damaged over 100,000 buildings (Fukushima, 1995; Ubaura, 2015). In November 2013, a British architect's visit to Iwaki in Fukushima Prefecture revealed that very little reconstruction work has been done, and most evacuees and inhabitants were living in temporary shelters. He also noted that the people in the area were close to losing hope about resettling in permanent houses. Security problems were also discovered (Thomas, 2013).

The post-disaster situation was quite complicated in the villages. On one hand, there were coastal villages left under mass debris due to the tsunami, hence were evacuated. On the other hand, there were villages in the vicinity of the Fukushima plant that were evacuated as well due to the radioactive contamination in the area even though most were not damaged by the earthquake. In March 2014, it was reported that about 267,000 survivors evacuated from Fukushima Prefecture were still living in temporary shelters (Iuchi et al., 2015). In addition, the social and psychological recovery of the people evacuated from the radiation area was an enormous challenge (Onda, 2012). Under such stresses, housing expectations of the survivors changed as time passed and according to changes in their conditions, which made permanent housing solutions more complicated in the long-run (Ubaura, 2015).



Figure 2.27 View of timber log temporary shelters built for a village settlement (IRP, 2013); temporary shelters built from container units (Alexander, 2014),

In some cases, the transitional shelters turned out to be permanent implementations. For example, in one of the villages in Iwate Prefecture, houses were built from timber composite elements (Fig. 2.28), and later on, it was decided to keep the houses instead of demolishing and building new ones (Sugawara and Harada, 2012).

Tanohata village (Fig. 2.29), which is a small fishing community and home to 25 families, was destroyed by the March 2011 tsunami and in October 2013, reconstruction work was started and mostly completed in one year. The delivery of the houses was planned for December 2014 with all finished interior and exterior facilities and materials (Foreign Press Center, 2014).

Kawauchi village in the Fukushima Prefecture, which was another village evacuated due to nuclear contamination (it was situated 20 km away from the plant), previously has almost 3,000 inhabitants. It was reported that 40% of its population returned though most were elders as youth had a fear of unemployment and, importantly, the impact of radiation and wished to live in urban centres. By March 2013, two years after the disaster, decontamination works progressed intensively and the upper layers of soil were removed several times (Ministry of Environment, 2013; Endo, 2014).



Figure 2.28 Transitional shelters built with timber composite (Sugawara and Hayada, 2012).



View of the village in 2006 (Foreign Press Center, 2014).



Figure 2.29 View of the permanent houses built in Tanohata (Foreign Press Center, 2014).

Shirahama village was rebuilt with a proposal from Kogakuin University that included modern timber frame houses (Fig. 2.30). The village was home to a fishery community and was reconstructed on a hill 40 metres above sea level that is a five minute away by car. The reconstruction began in June 2011, and the houses were delivered by November 2011. Seven two-storey houses (66 m²) and three single-storey houses (43 m²) were built. An apartment block was also built for housing elderly people who live alone and orphans of the village. Professor Goto, who was the main designer, pointed out that shelter of this quality built after a disaster in place of temporary and permanent houses could decrease the cost and labour needed in conventional methods (Goto, 2011).

Iidate village was one of the first long-term implementations completed in 2012, which was planned like public housing. The village was evacuated due to nuclear contamination. In terms of decontamination efforts, the top layer of the soil was cleared away (Drone Adventures, 2014). However, some areas of the village are still not inhabited as they are restricted until 2016 to ensure the radiation level is below the allowed limit. The main livelihood of the villagers is flower farming (Recovering Tohoku, 2012). Nine single and 14 semi-detached family houses were built (Fig. 2.30). The houses have insulation layers under the roof and in the walls (Suzuki, 2014).



Figure 2.30 A two-storey house in Shirahama (Goto, 2011); semi-detached houses in Iidate (Suzuki, 2014).

In Sumita town, houses were built as timber frame structures from locally available cedar and promoted as Sumita-style reconstruction. There were two options for house plans: a single storey with an area of 78 m² and two storeys with an area of 132 m². Before implementation, real-scale models of the houses were shown to the beneficiaries. The houses were energy efficient and included solar PV panels (News from Iwate's Reconstruction, 2013). The houses were implemented near the centre and the southern area of the village.

The fact that disasters strike the poor repeated itself yet again in Japan, which was expressed by an academic from Tohoku University¹³ in reference to fishery communities. Additionally, it was noted that these communities insisted on not moving to a relocation site; indeed, they preferred to retain their fishing facilities instead of having new housing implementations and continued living in temporary shelter (Hays, 2014).

Japan is a highly urbanised country as 70% of the population lives in urban settlements; the elderly live mostly in rural areas (Shelter Projects, 2012). This urbanisation is the result of the preference for dense settlements with high population communities rather than sparse settlements with low population. Furthermore, given the issue of population ageing in remote rural settlements, many rural villages are seen at risk of turning into very small settlements with unused or no facilities. From this perspective, a village in Miyako city was relocated close to a larger village that was already situated beside a train station. In this example, the aim was to ensure accessibility of the village and integration with other surrounding settlements through public transportation. However, from a social perspective, there are rural settlements that cannot be subjected to such implementations, e.g. neighbouring villages with a history of conflict between them based on different issues (IRP, 2013).

¹³ "The tsunami attacked our poorer communities and [has] shown us how much they were already struggling... No one wants to see that. No one wants to face it" (Masashige Motoe, from: <http://factsanddetails.com/japan/cat26/sub161/item1744.html>).

2.5 Discussion

This part concludes the chapter by bringing short discussions on the literature review and outlining the key learning points from the review and the examples studies in the context of reconstruction of the rural after a disaster. Also the contribution of the literature review to the focus of the study and the case selected to study is outlined in the end.

Why the rural is more vulnerable?

In theoretical understanding of natural disasters, they are rooted to the socio-economic, demographic, and political dynamics forming the progression of vulnerability. In the case of rural communities, the highlight of the review is that they are highly vulnerable and lack of coping capacity in the wake of an earthquake as that it generally results in a disaster. Prelog and Miller (2013, p: 2) clearly wrote: “ (...) low-cost rural places are home to people with characteristics that increase vulnerability to impacts of disaster, such as lower incomes, lower levels of education, and livelihoods that depend on resource-based occupations”. Putting in different words, as a result of suffering socio-economic disparities, rural areas are left with poverty challenge given the lack of diversity in source of income due to the lack of employability skills.

Comparing with the urban, where people easily attain higher education and has a handful of diversified job opportunities, in the rural, people – mostly young generation- look for migration into an urban centre to establish a better welfare instead of being solely dependent on local-based resources which carry the risk of being affected by natural disasters. However, one can hardly imagine an urban resident migrating into a rural settlement as a result of being affected by a natural disaster. Indeed, in most cases, they still receive an income since their jobs are secured by the official records of the state, which does not apply to most rural people. Besides, most urban people take advantage of different insurance schemes, e.g., for their health and properties, which the poor, i.e. the rural in the context of the study, are generally left out since they cannot afford. This reflects on the built environment as well. That is, the poor economic conditions inevitably limit the capacity of rural people to build quality buildings. As the examples from the earthquake experiences in Taiwan, Iran, Pakistan and Peru outlined, the rural built environment is largely composed of inadequately built masonry structures, which cannot withstand earthquakes and results in devastation and cause large death toll. For that reason, a state intervention is necessarily expected to support the recovery of the people affected. However, there is also the fact that the rural areas are often excluded from the disaster

mitigation plans as the plans often focus on populated and profitable areas, namely urban centres (Zakour and Gillespie, 2013).

Why the post-disaster reconstruction of the rural is criticised as top-down?

In the theoretical perspective, vulnerability is also a guide to a better disaster recovery as it integrates society-based causes (i.e., socially constructed) into the decisions made and plans implemented in an attempt for risk reduction and mitigation that aims to reduce vulnerability. Having said, in practice they are fully grasped when it comes to reconstruction of the built environment. Considering the vulnerable built environment in the rural, the state interventions often target replacing the traditional building practice by implementing housing projects using non-local materials. Thus, the main critique on the practice is that it heavily focuses on housing at a standardised level and often employs a relocation strategy by neglecting most of the elements advised to take into account.

To outline a general evaluation to the post-disaster reconstruction approach, the examples proved that the post-disaster housing reconstruction has a political aspect that it is generally run through programmes set by governmental authorities. As discussed in the theoretical perspective, this has to do with either short-term goal (e.g. Italy) or long-term goal by means of integration of development and reconstruction plans (e.g. China). Since this brings a centralisation in the progress of post-disaster reconstruction, the majority of the projects implemented through a top-down approach, and with only a small number of unique projects implemented through a bottom-up approach which allows collaboration of different non-profit parties. This is understandable to some extent given the fact that the projects are largely funded by the state budget, which intrinsically brings a 'top' control to the implementations. There is also the fact that in developing such projects, time plays an important role. To say, since disaster-affected people demand for a house to get back to normalcy, in order to speed the process, some aspects of the adequate housing, which brings an objective basis for evaluation, are generally neglected.

Why the reconstruction approach matters?

The method of reconstruction is also critical in terms of allowing owner-driven approach and imposing a contractor involvement. To begin with the first, the studies imply that the involvement of the beneficiaries to the reconstruction of their own houses develop higher satisfaction with the implementations (e.g. Barenstein, 2006). However, this approach has

twofold. Firstly, if the beneficiaries are left alone in the construction phase, they may repeat the structural faults when they are building their house, which does not contribute to the aim of vulnerability reduction, like the case of Bitta village in India where some of the houses were built through owner-driven approach were still found vulnerable by experts (Samaddar and Okada, 2006). Secondly, in the case of the reconstruction process pulls out beneficiaries and designates contractors entirely, and then they may ignore local factors and force relocation of the beneficiaries in order to conduct the construction process rapidly, which cause relatively low satisfaction with the implementations (e.g. Barenstein, 2006; Sanderson et al., 2011). Therefore, these concerns suggest the combination of both methods. Having said, this also may cause problems. For example, when the beneficiaries from a village are left between the choices of these two methods, the village settlement and community may be divided. That is, the beneficiaries prefer owner-driven approach may remain in their former location, whereas the houses to-be built by a contractor may be in a relocation site, like the case of Vondh village in India. On the other hand, when the reconstruction is planned in a collaborative manner, which the design considers local sources and allows beneficiaries to build some part of their houses, of which structural parts erected by a contractor, then this will be a more of promising reconstruction approach, like the cases of Da Ping village and Yang Liu village in China.

As detailed in the theoretical perspective, the ideal reconstruction approach to post-disaster housing is participatory, namely, a bottom-up approach instead of the top-down approach. To say, the participation of beneficiaries is suggested since it empowers local knowledge and uses local sources, which can be a contribution to low-cost and ecological implementation. The owner-driven approach in India, the mixed-approach in the villages of Yang Liu, Da Ping and Nian-Hua in China, the eco-housing in Pescamaggiore village in Italy and the use of timber as locally available material in Japan can be taken as the examples of this approach. On the other hand, the top-down approach is explained as which aims standardisation and brings unfamiliar technology in reconstruction. In this regard, the villages of Moti Chirai and Lakhpar which were relocated and reconstructed via a contractor-driven approach in India, the Tien Sheng Qiao village in China, and the MAP projects in the villages of Onna and Poggio Pienze in Italy can be taken as the examples of this approach. By the same token, the drawbacks of forced relocation, which is widely preferred in the latter approach, can be understood. However, the theoretical perspective does not suggest relocation if the area affected is naturally not hazardous. The emphasis here is that the rural communities are strongly attached to their lands and environment. In this regard, the villages of Tanohata and Shirahama in Japan can be

taken as examples since both are fishery communities and the reconstruction plan had a respect for their livelihood as they were not relocated elsewhere. In contrast, the village of Tian Sheng Qiao in China and the village of Lakhapar in India are the examples of relocation without considering the rural life pattern of the people, which resulted in low occupancy rates and mostly abandoned houses.

Why the house loan scheme matters?

The discussion thus far focused on the aspects of structural mitigation by means of adaptation of the built environment, which attempts to reduce the susceptibility of the building stock. The theme of adaptation establishes an understanding of the link between the impacts and changes occurring after a disaster. In this regard, the devastation of the built environment is the impact of earthquakes and the reconstruction with adaptive measures is the change. Accordingly, considering the examples reviewed, it can be said that the reconstruction of the building stock in disaster-affected rural settlements is transformative (with or without a consideration to the locality) as an adaptive measure focusing on the physical assets of the people affected.

However, as explained in the theoretical perspective, adaptation is a comprehensive theme that considers also non-physical assets of the people affected. That means non-structural mitigation should also be a part of the change in terms of increasing the coping capacity of the people. For instance, the financial assistance for the housing reconstruction is essential as well when it targets the rural people. More explicitly, considering the requirement of the right to adequate housing, the loans allocated to beneficiaries for the reconstruction of their houses should not burden their economic capacity, which already suffers poverty. In this context, from China, the villages of Yang Liu and Yaojin exemplify the housing reconstruction projects donated by civil and private organisations, and Chaping village exemplifies the policy-led collaboration between urban entrepreneurs and villagers. Nevertheless, the majority of the housing reconstruction projects after disasters are funded by the governments in charge, which requires the beneficiaries to repay the loan. For example, in China, the loans partially funded the reconstruction of the houses in Yanyan village as that some villagers had to apply for supplementary bank loans, which clearly burdened their economic status. In India, the beneficiaries who had been allocated the smallest amount of loan were the most satisfied with the implementations, which can be understood as that the people do not like to be under such burdening responsibly. In line with this, a survey finding from China reveals that the

beneficiaries hardly think that they are able to repay the loans as they struggle to establish a stable level of income, which highlights the point abovementioned.

Why the diversification of livelihood matters?

In terms of supporting the people's financial recovery, livelihood plays a significant role since it can be considered as economic indicator (i.e. level of income) as well as demographic (i.e. employability). As that mentioned earlier, the reconstruction process should, firstly, respect for their livelihood-based location dependency. If the relocation is necessarily preferred, the adaptive measures should be taken for the change in people's livelihood. Otherwise, a forced relocation in this manner may hinder the livelihood recovery of the people. Nevertheless, in general, poverty alleviation of the rural is deemed an important aspect in adaptive measures which guides to building coping capacity with disaster. A study from China points that agriculture-dependent households are more vulnerable than the households with other source of income along with their agricultural income. This suggests that the diversity in source of income carries people to better economic conditions. Successful livelihood recovery, i.e. defeating poverty, can share role with social recovery as well. That is, when a disaster strikes, a flow of migration out of the area affected also follows (e.g. after the L'Aquila earthquake), which is deemed a strategy to cope with the impacts of disaster. However, it may turn out permanent since the youth already attracted to the urban for better job opportunities; thus, they may not return back to their villages, which is also why the rural is left to ageing population, like the case of Kawauchi village in Japan. On the other hand, with socio-cultural projects, for example, prevention and promotion of cultural art can reinvigorate local tourism which in turn diversifies job opportunities preventing migration, like the case of Nian Hua village in China.

Lessons learnt from the examples and the theoretical framework: the principles to-be used in the evaluation of the post-disaster Reconstruction in Turkey

Have understood the theoretical perspective and the vulnerability of the rural, four examples of post-disaster housing reconstruction are reviewed through India, China, Italy and Japan that each represents different level of human development index. The review of their reconstruction strategies between 2001 and 2011 provided a better understanding of the similarities in the challenges. In details, relocation, contractor involvement, house loans, choice of material and construction model, standardised house layouts and insufficient plot size, livelihood recovery and diversification are found among the key elements challenging the success in the strategy of post-disaster housing reconstruction.

As the review in this chapter established a more objective basis to evaluate the post-earthquake housing reconstruction strategy of Turkey, the preliminary elements identified are the role of socio-economic vulnerability of the rural (and the attractiveness of the urban moving the migration flow), the role of livelihood in the vulnerability of households (and the change in source of income), the domination of authorities and the inflexible reconstruction approach (the limited space for beneficiaries to take action), and the financial load of house loans (the model and amount of repayment threatening the recovery of the households). These elements contributed to the content development of the study by suggesting what to analyse to find how the state has changed the strategy to the post-earthquake housing reconstruction in the rural and how the rural is adapted. With this in mind, further detailing to identify the indicators to examine the elements selected is carried out through additional review of the literature, which was also a part of the development of survey design of the research methodology of the study.

To begin with the elaboration of the vulnerability of the rural built environment and the role of socio-economic vulnerability of the rural in the context of earthquakes, in similar fashion followed in this chapter, a further focus on rurality is brought and the background of the vulnerability of the study region is explored in this next chapter.

Chapter 3

Rurality and an exploratory pilot fieldwork on the traditional rural built environment in eastern Turkey

This chapter highlights the meaning of rurality and focuses on the vulnerability of rural eastern Turkey through socio-economic indicators and seismic activity of the area. In an attempt to understand the extent of transformation in the built environment – with the housing implementations following earthquakes – a pilot fieldwork was conducted in a number of villages naturally formed. The chapter continues by outlining the findings on the basis of traditional and non-traditional construction practices explored in the fieldwork. A discussion on the contribution of the fieldwork concludes the chapter.

3.1 Rurality and rural settlements

It would not be wrong to say that there is a conflict between rural and urban in terms of their meanings and their existence. In today's world, the picture you see from rural and urban areas differs in countries from different development levels. Even though there are discussions made to find a clear definition of rural, there is no one single definition accepted worldwide yet. Indeed, nearly each country makes a definition according to its characteristics. Nevertheless, there are indicators widely used at measuring and comparing to define whether an area is rural or urban. These indicators generally include population size and density, geographic situation, linkage between surrounding settlements in terms of transportation variety and travel time, type of settlement layout and its characteristics, settlement density, variety of public and private sector facilities, income level and its source, dependency on agricultural activities, education levels of households, size of households and living style and habits. Such diverse indicators are usually employed by academics to investigate particular disparities between urban and rural settlements, whereas in most countries the difference to define rural and urban is often simplified and rural is defined based on the size of population or density of settlement.

For example, in the UK, only for England and Wales, the rural definition was firstly introduced in 2004 and the rural and urban areas were redefined in 2009 in the Local Authority Classification (LAC). According to the LAC, urban areas are divided into three categories. 'Major urban' is used for settlements with a population of more than 100,000 or settlements with a population of more than 750,000 when 50% lives in urban areas. 'Large urban' is used for settlements with a population of 50,000 or settlements with a population of 250,000-750,000 when 50% lives in urban areas. 'Other urban' category defines the settlements with more than 37,000 inhabitants or settlements where 26% of the population lives in rural areas and larger market towns. Similarly, rural areas are categorised into three. 'Significant rural' is used for settlements with less than 37,000 inhabitants or settlements where more than 26% of the population lives in rural areas and larger market towns. 'Rural-50' defines settlements where 50-80% of the population lives in rural areas and larger market towns. 'Rural-80' is for settlements where more than 80% of the population lives in rural areas and larger market towns (DEFRA, 2010).

Differently from England and Wales, in Scotland there are 8 categories in three groups. 'Large urban areas' covers settlements with a population of more than 125,000. 'Other urban areas' is used for settlements with 10,000-125,000 inhabitants. In the classification of Scotland there is a group named 'small towns', which is defined not only according to size of population but also road accessibility. For example, 'accessible small towns' covers settlements with a population of between 3,000 and 10,000 and within 30 min. drive-time to a settlement with 10,000 inhabitants. 'Remote small towns' defines the same size of settlements within drive-time of between 30 and 60 min. to a settlement with 10,000 inhabitants. 'Very remote small towns' is used for the same size of settlements, but within more than 60 min. drive-time to a settlement with 10,000 inhabitants. Rural areas are divided into three categories as well. 'Accessible rural' covers settlements with a population of less than 3,000 and within 30 min. drive-time to a settlement with 10,000 inhabitants. 'Remote rural' defines the same sized settlements within 30-60 min. drive-time, and, finally 'very remote rural' defines the same sized settlements within more than 60 min. drive-time to a settlement with 10,000 inhabitants (Scottish Executive, 2004).

A more different approach was employed in the USA to define its rural and urban areas. Due to having a large population, the Office of Management and Budget classified the settlements as metropolitan and nonmetropolitan areas. Metropolitan areas are accepted as broad labour-market areas and, thus, classified according to their capacity. For example, 'central counties'

covers one or more urbanised areas with highly-dense settlements with more than 50,000 inhabitants. ‘Outlying counties’ are defined as dependent on central counties in two ways: they may host the 25% of workers coming from adjacent central counties, or they may provide the 25% of workers outside to the central counties. Nonmetropolitan areas are simply defined as outside of metropolitan boundaries, and grouped into ‘micropolitan areas’, which are labour-market areas based on urban settlements with a population of between 10,000 and 49,999, and ‘non-core counties’, which are not part of either metro or micro areas at all. In the USA system, there are three different concepts to define ‘boundary’ of urban and rural areas. The first one is the administrative concept, which is mainly used for rural development programmes and to identify urban-based municipalities. The second one is the land-use concept, which refers to the density of a settlement that can be observed through aerial view. The third one is the economic concept, which is mostly used for rural research focusing the impact of urban areas in means of labour, trade and media (USDA, 2013).

In Canada, ‘rural’ is defined as areas with a population less than 1,000 inhabitants and with a density of population; also, less than 400 people/km². In accordance with the definition set by the OECD, Canada uses the term ‘community’ to mention rural when the population density is less than 150 people/km². The term ‘community’ helps to define regions whether urban or rural in the Canadian system. For example, if more than 50% of the population lives as a ‘rural community’, the region is called ‘predominantly rural’. If it is between 15 and 50%, the region is called ‘intermediate rural’. It is called ‘predominantly urban’ when less than 15% of the population lives as a rural community. Predominantly rural regions are divided into three groups: adjacent to metropolitan centres, not adjacent to metropolitan centres, and northern regions. This sub-classification aims to decrease health-related disparities in rural Canada (Minore et al., 2008).

According to the urban-rural frame created by the OECD and EU, Italy can be considered as a balanced country in terms of rural to urban proportion. It has 27% of its lands classified as ‘predominantly rural’ where only 10% of the country’s population lives. Italy is largely an ‘intermediate rural’ country according to the OECD regional database (2009, p: 30-31) and 37% of its entire population lives in such areas and, at the same time, 34% of its national GDP is produced in these areas. This relatively high economic performance is linked to the size and density of the population and transportation networks between urban and rural areas. However, the Ministry of Agriculture of Italy defined a more extensive classification than the OECD, and grouped its rural regions into three. The first one is ‘rural regions with specialised intensive

agriculture', which have fairly high population density and are close to large urban centres. The second one is 'intermediate rural regions', which are located on hills and mountainous areas, but have the characteristic of declining agricultural activity. The third one is 'rural regions with development problems', which have very low density of population and suffer from disparities, such as the lack of public and private facilities (OECD, 2009).

In Japan, the settlement with less than 5,000 inhabitants is called 'village'; when the settlement has a population of between 5,000 and 50,000, it is called 'town' and settlements with more than 50,000 inhabitants are called 'city'. Villages in Japan are administrated by dividing them into smaller districts, and even if it is a small village it has a municipality run by a village office with full-time officers (Kitano, 2009).

In Turkey, the size of the population is currently the only official indicator used to classify urban and rural areas according to the Village Act in force since 1924. Settlements with less than 2,000 inhabitants are classified as 'villages', settlements with a population of between 2,000 and 20,000 are classified as 'small towns' and settlements with over 20,000 inhabitants are classified as 'urban centres' in this act. The second article of the act gives a definition of a 'village': a settlement with a single mosque and school, surrounded by pastures and grasslands where the inhabitants live in dispersed built-up layout including their yards and farming lands. For administrative purposes, the Metropolitan Municipality Act (MMA) was enacted in 2004; and the Municipality Act (MA) in 2005. The MA states that settlements with over 5,000 inhabitants may have municipalities. Accordingly, villages and sub-villages may unite to have a population of a minimum of 5,000 in total, and their locations must be within distance of at least 5 km. to the most adjacent 'urban centre' area, in order to establish a municipality. Local municipalities are directly linked to the provincial municipality. However, primarily the 'reeve' and secondarily the 'senior council' are the administration bodies in a village in Turkey and linked to both local and provincial municipalities. Due to insufficient classification in the acts and confusion between these acts, the current government prepared a new draft, which proposes to categorise the villages into three, based on their size of population. The first category covers villages with more than 2,000 inhabitants (and up to 5,000); the second category is for villages with a population of between 1,000 and 2,000. The third group covers villages with less than 1,000 inhabitants. The aim of this further classification is to spread more even administration and public services in rural Turkey. After all, the classifications given show how differently the settlements can be defined as rural or urban, and how inevitably each country sets its unique methods of classification.

Rural settlements are physical evidences of ages-long adaptation to geographical characteristics (including micro-climate, topography, availability of and distance to natural resources) in combination with various social aspects (primarily local culture and further demographic characteristics such as economic structure). Each of them is a unique expression, as a spatial pattern, of local material use, traditional construction technique and settlement layout as a result of this combination (Cole and Lorch, 2003; Kavas, 2011). They are built spontaneously as per people's demands, and their comfort for environmental thermal changes and spaciousness as a living space of a household are the dominant drivers when they are constructed (Spence and Coburn, 1987). Mandal explains how human geographers view rural settlements from a broad perspective when they study:

“Geographers consider rural settlement as man-made habitat on the rural landscape, based on primary occupations such as agriculture, forestry, mining, fishing, hunting, etc. which flourish on local resources. They examine the settlement features such as buildings and their architectural styles, roads, and lanes, in order to distinguish new categories and patterns and determine their functional relationships. Thus the size, spacing, form and functions of rural settlements and their origin are essentials of the subject matter. Their regional variations are mostly dependent on the sequential growth of their morphology and the social and economic structure of the society they represent and serve”. (Mandal, 1979, p: 24-25).

What values rural settlements from the architectural perspective is actually the particular forms of their structural systems, which are generally types of masonry and the preference of local materials and their different use. Despite they are built without any professional consultation from architects and engineers, they are the product of craftsmanship of masons and carpenters, who transmit traditional construction knowledge throughout generations by non-verbal means (Oliver, 2003). However, due to several reasons, the trend in construction of traditional architecture has drastically declined among rural communities in the worldwide extent. The architectural value they had degraded in time as they are mixed with non-local materials, and thus, there was born a new category of building, that is ‘non-engineered buildings’, which is used to refer to hybrid structures that are a mixture of local (e.g. stone, timber and adobe) and non-local (primarily concrete and reinforced concrete) materials (Boen, 2001; Green, 2008; Boen and Tribadi, 2009). One of the main reasons is the lack of knowledge transmission for the construction details of traditional buildings; as a result, year by year the number of craftsmen who build structures ensuring safety and a certain quality of art has decreased. The other reason is the impact of rapid modernisation and industrialisation through a westernised motion. Modernisation has brought a sharp physical and social transformation in the long run. The size of urban areas has expanded due to increased population, which was the result of

migration from the rural to the urban. This trend has grown in parallel with the period of rapid industrialisation of construction materials, which was the technology mainly exported to the rest of the world from the west. The most prominent consequence was the massive influx of prefabricated building materials to rural and remote settlements for construction. Although the idea behind the introduction of non-local materials was to reduce the cost of construction via a readily available large stock of materials rather than customised craftsmanship, and to ease buildings process and fixing, it was highly misinterpreted and misapplied in most rural settlements (Green, 2008; Curtis, 1996). For example, galvanised aluminium sheets are advantageous as they drain rain and prevent it leaking into houses; on the contrary, they are usually found uncomfortable for extreme thermal conditions (Oliver, 2003).

To give another example, application of reinforced concrete frame houses costs higher than expected and is less effective for regional aspects such as the case found in rural Egypt by Hassan Fathy in 1973 (Fathy, 1973) cited by Curtis (1996). However, despite the good seismic-performance records of traditional rural structures, which have been built in coherence with the full details of traditional knowledge, due to the scarcity of craftsmen and knowledge transmission, these structures have long suffered from the lack of good quality construction, lack of maintenance and inappropriate and random alterations. Therefore, they have become vulnerable to earthquakes in particular, and as they collapse easily due to weak details and further faults in their structural systems, they have been pointed out as the main reason for casualties (Jigyasu, 2008). Under such circumstances, construction practice has significantly changed in the last couple of decades, and resulted in transformation of rural settlements, which gave birth to copied and look-alike settlements and buildings that still fail to ensure a good quality of earthquake-resistant construction standards (Boen, 2001; Green, 2008; Boen and Tribadi, 2009).

In short, “rural areas have undergone and are undergoing major changes” (Shouten et al., 2009, p: 2) under severe influences of urban areas that generally leave them with certain disparities and suffer primarily migration and poverty (See p: 34). Not differently, as an earthquake-prone country and having large numbers of rural settlements, Turkey has also experienced social, economic and physical change and transformation in its rural environment within the past decades. The following part outlines how the focus region of this study differs from the other regions of Turkey.

3.2 Rural eastern Turkey

There are numerous studies on Turkey mainly comparing its rural characteristics with the EU and OECD countries (Gulumser et al., 2011; Gulumser et al., 2007; Ogdul, 2010; Bojnec, 2011). These studies use specific indicators and objectively reveal that Turkey is mostly a rural country with a few metropolitan areas, which are located on the west side of the country. Internal migration from east to west of Turkey has been one of the main problems in national development since the 1950s. The west of the country has been rapidly urbanised, while the east remained steadily rural. This argument has been issued in a large number of studies from different perspectives such as sociology, economy and management, construction and planning.

3.2.1 Socio-economic vulnerability

As a consequence of such uneven urbanisation in the country, today 70% of the population in Turkey lives in urban areas, while 30% lives in rural areas. This ratio was the opposite five decades ago (Bojnec, 2011). While in 1960 almost 70% of the population was living in rural areas, after 1985 the proportion of the population living in urban areas started to increase with a growth rate of 60% per year. The Marmara Sea Region (including Istanbul, Bursa and Kocaeli) was the main industrialisation area (EEFIT, 2003). In Figure 3.1, Gulumser et al. (2007) prove that only five provinces, including Istanbul, Ankara, Bursa, Izmir and Kocaeli, are highly attractive urban areas and they are home to nearly 31% of the entire population though they cover only 7% of the country. Although being the largest region of the country (20% of the lands of the country), the Eastern Anatolia Region has less than 10% of the entire population and the population density it has is half of the national average (SPO, 2000).

The problem is that agricultural areas now only offer limited job opportunities, and thus cannot compete with the current labour market. As a result, especially among young people attracted to urban areas, and from there, out-migration starts which causes increase in the average of the population age besides decreasing the size of the population in rural areas. In contrast, in several EU countries such as Germany, Belgium and Poland, rural areas are still attractive to young generations as there is a variety of job markets and business opportunities, which is probably the result of well-established linkages between rural and urban. In France and the USA there are rural regions that have increasing population as they have influx both from other rural and urban areas (OECD, 2009).



Figure 3.1: The urban attractiveness of the provinces in Turkey (Gulumser et al., 2007).

Based on the indicators of population density and agricultural productivity, Turkey carries a complicated picture that can be understood with further indicators. For example, although many of the provinces in the South-eastern Anatolia Region are populated and urbanised (Fig. 3.1), the region has the lowest education level in the country. Similarly, even though eastern and north-eastern Turkey has large agricultural areas, as shown in Figure 3.2, they have the lowest productivity rates in the country (Ogdul, 2010).

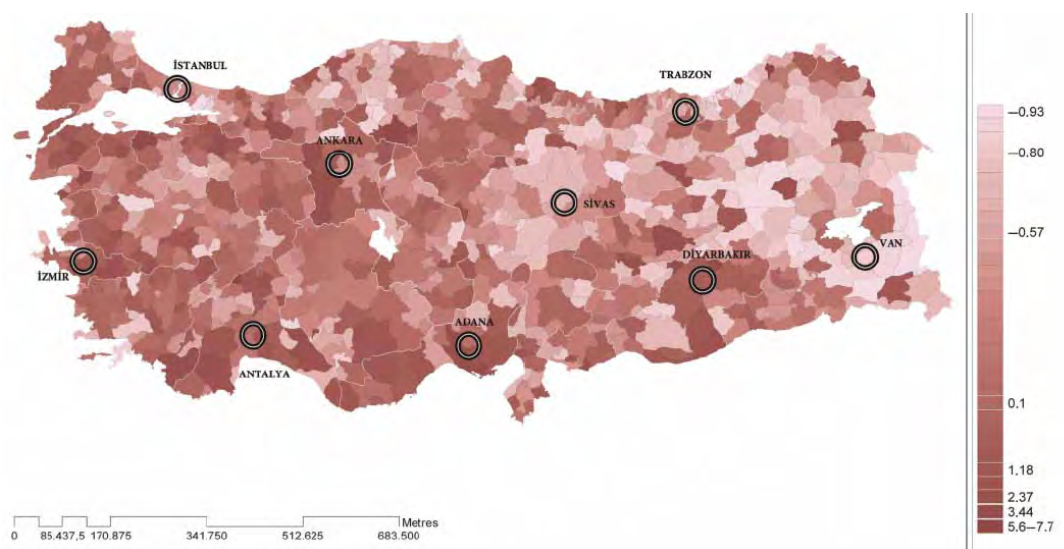


Figure 3.2: The agricultural productivity of the provinces in Turkey (Ogdul, 2010).

Opposed to the growing average income per capita at national level, the Eastern and the South-eastern Anatolia Regions remain far behind, which is often mentioned in EU reports on development about Turkey. Importantly, the regional inequalities in Turkey rely on the issues beyond economical, educational and civilisation. These issues include cultural background,

conservative vision, ethnicity and terror problems, which create social tensions between the west and the east of Turkey (Ilhan, 2002; McClure, 2011; Rousseau, 2012). In the report published by BTI in 2012, it was stated: “The extreme income disparities between rural and urban regions, particularly in the eastern and south-eastern regions of the country are and will remain for some time an ongoing source of social problems.” (Bertelsmann Stiftung, BTI 2012).

Turkish governments have not ignored the disparities between the rural and urban, and have developed pilot projects, which basically aim at creating ‘urbanised rural areas’ to achieve the ‘modernisation’. These projects are called the Village-Town Project (Köy-Kent Projesi), the Central Village Project (Merkez Köy Projesi) and the Agro-Town Project (Tarım-Kent Projesi). However, due to their poor design (ignorance of the local and regional indicators) and the lack of coordination between the state bodies, the projects did not give any expected results; thus they are suspended (Marin, 2006). Only the Agro-Town Project was transformed into the Agro-Village Project and is currently undertaken by TOKI (2012). All of these projects had local rural scope rather than a regional perspective.

The first regional-scaled development programme was introduced in the early 1980s and was called the South-eastern Anatolia Project, (with its Turkish abbreviation, GAP). This project firstly started as a development plan for water resources and land management, and then it was transformed into a multi-sectored programme, which included socio-economic targets, to improve the income level of people in the region and their living conditions, to preclude the out-migration and to establish socio-economic stability by enriching the job market in the region, especially in the rural areas (GAP RDA, 2006). As positive influences of the GAP, urbanisation accelerated and expanded throughout the region by taking migration from the rural areas within. Furthermore, the level of agricultural productivity in rural areas of the region was also increased and some provinces were industrialised, which provided various job opportunities to young generations and prevented out-migration from the region (SE&EA DP, 2008). As a further result, the terror problem could not have expanded in the region as much as in the Eastern Anatolian. Differently, the Eastern Anatolia Region has never met such a huge project; only small-scaled local plans were started by the regional development agencies. Besides, due to its geographical conditions, only 10% of the land in the region is available for cultivation. It is the least industrialised region and has the highest out-migration ratio in the country. The provinces Van and Erzurum have the largest areas in the region and they were intended to be urbanised, but could never achieve to the point expected.

3.2.2 The seismic vulnerability of eastern Turkey

The seismic hazard maps^{14,15} (Giardini et al., 1999; Grunthal et al., 1999; Gurenko et al., 2006; Emre et al., 2012) indicate that western and eastern Turkey carry highly active and complex seismic character. What makes eastern Turkey more prone to earthquakes is its geophysical location, which is acknowledged as the collision zone of the Eurasian and Arabian plates (Aktar et al., 2004; Turkoglu, 2009). From the north, the Eurasian plate, and from the south, the Arabian plate generate compression, and they together force the zone to move westwards through the two major faults, which are the boundaries of the Anatolian micro-plate (Aktar et al., 2004). The North Anatolian Fault is the north boundary and it is a right-lateral strike-slip fault that is highly active, which generated many severe earthquakes in the last century¹⁶ (Avsar et al., 2013; Poyraz, 2014). The East Anatolian Fault is another major fault in Turkey, the east boundary of the Anatolian micro-plate, which is a left-lateral strike-slip fault that has a moderate seismic activity. In the last two centuries it did not generate a seriously damaging earthquake, but given the long time passed and energy accumulated in the area, it is highly expected an earthquake will occur in the near future (Yilmaz et al., 2006; Sertcelik, 2012). More significantly, these two major faults conjugate¹⁷ in eastern Turkey with the potential of producing an earthquake as severe as 7.5 M_w (Aktug et al., 2013), which caused disasters several times in the history¹⁸. As Figure 3.3 shows, it is clearly the Eastern Anatolia Region that is under higher risk of earthquake exposure than any other regions of the country, since it covers most of the high risk zones. Thus, between the years 2006 and 2009, nearly 3,000 earthquakes and tremors have been recorded in the region (Ozturk and Bayrak, 2012). Figure 3.4 is a simplified illustration of the forces affecting the collision zone and Figure 3.5 demonstrates the motions of different fault types, given that Turkey suffers strike-slip faults.

14 Of the Global Seismic Hazard Assessment Programme, which was launched in 1992 and completed in 1999. More information can be found at: <http://www.seismo.ethz.ch/static/GSHAP/>.

15 The Turkey Active Fault Map was firstly introduced in 1992 with the scale of 1:1.000.000. In 2012, the map was restudied in more detail, and reproduced with the scales of 1:250.000 and 1:25.000. The one of 1:250.000 is available to access, but the other one of 1:25.000 is in the archives of the General Directorate of Mineral Research and Exploration of Turkey.

16 The two most severe earthquakes that the fault generated are the Erzincan earthquake in 1939, with a magnitude of 7.9 M_w (Poyraz, 2014), and the Kocaeli earthquake in 1999, with a magnitude of 7.4 M_w (Ansal et al., 1999).

17 The location where two faults conjugate is the district of Karliova, in the province of Bingol, known as Karliova Triple Junction. A study revealed that an earthquake with the magnitude of 7.5 M_w can create an 80 km long rupture through the area (Aktug et al., 2013).

18 The surrounding area of the junction, so the province of Bingol, was shaken by earthquakes in 1949 (7.0 M_w), 1965 (5.6 M_w), 1971 (6.8 M_w), 2003 (6.4 M_w), and 2005 (5.7 and 5.9 M_w) (Aydan et al., 2003; Kekovali et al., n.d.; Erdik et al., n.d.; Tuysuz and Erturac, n.d.).

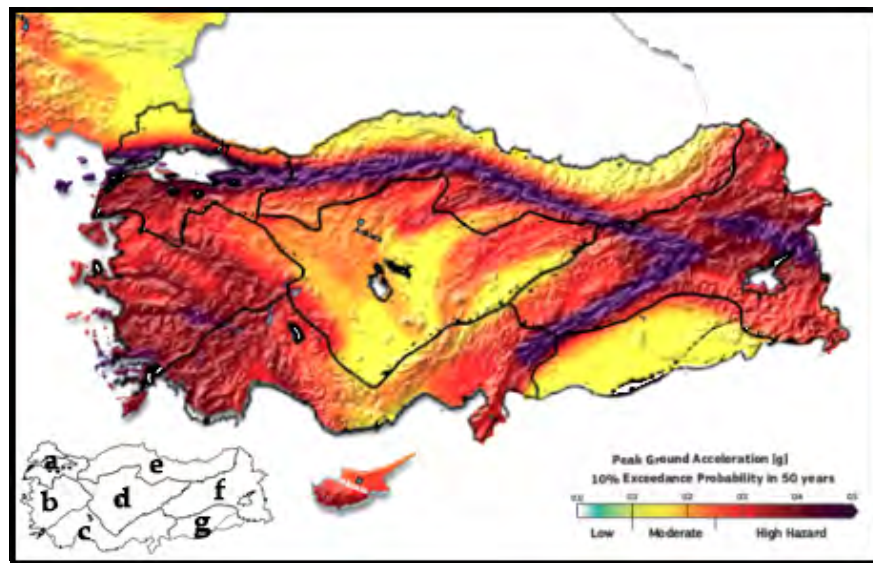


Figure 3.3 The seismic hazard map of Turkey, prepared by the GSHAP; high hazard areas in purple are in line with the North Anatolian and East Anatolian Faults (Source: <http://horizon-magazine.eu/sites/default/files/SHARE-map.png>). The regional map of Turkey is overlapped on the seismic map: (a) the Marmara region, (b) the Aegean region, (c) the Mediterranean region, (d) the Central Anatolia region, (e) the Black Sea region, (f) the Eastern Anatolia region, and (g) the South-eastern Anatolia region.

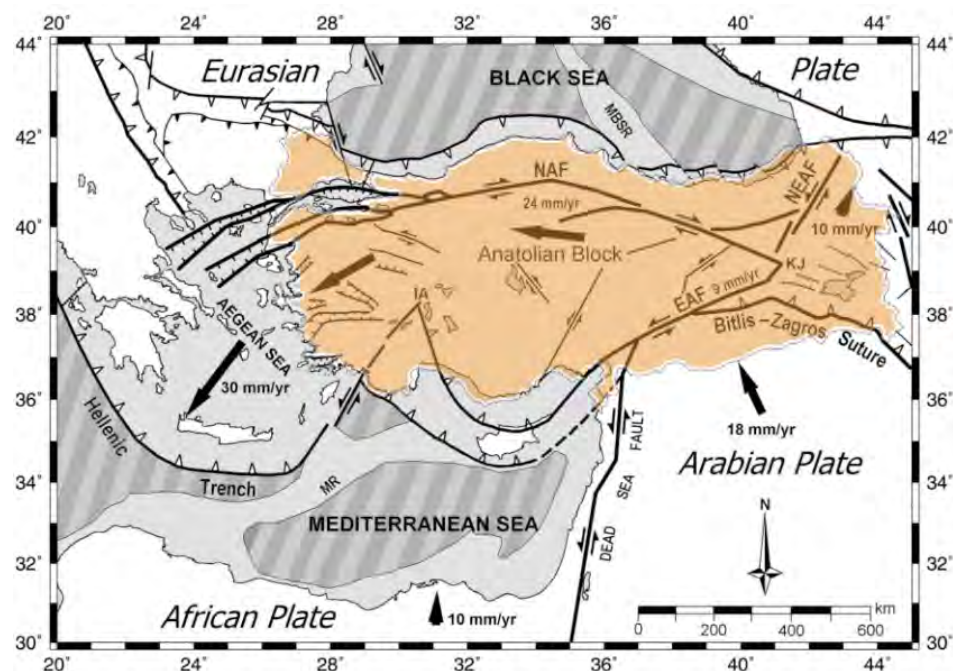


Figure 3.4 The plate tectonics affect Turkey, the Anatolian Block; the North Anatolian Fault, NAF, moves 24 mm/years, the East Anatolian Fault, EAF, moves 9 mm/year, the Northeast Anatolian Fault, NEAF, moves 10 mm/year; KJ is the Karlova Triple Junction, under the influence of three faults (Gulen et al., 2002).

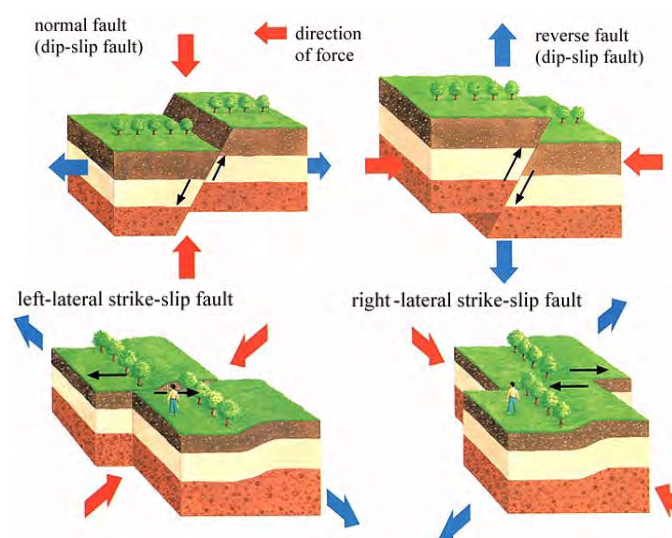


Figure 3.5 The types of fault movements (Source: <http://www.hp1039.jishin.go.jp/eqchreng/af1-2.htm>).

There is no need to mention that the risk of earthquake exposure of the region threatens the building stock in general, but it should be emphasised that the threat is deemed more serious for the rural areas, which are dispersed and remote villages, since the built environment that exists is deemed considerably vulnerable to earthquakes (Spence and Coburn, 1987; Korkmaz et al., 2010). Examples of collapsed, poorly built rural houses are given in Figure 3.6.



Figure 3.6 Examples of collapsed buildings from the earthquakes in Bingol, 2003 (A) (Karasin and Karaesmen, 2005); Elazig, 2010 (B) (Celeb et al., 2010); and Van, 2011 (C) (Kızılkant et al., 2011).

Past experiences have proved the physical vulnerability of the rural settlements given that earthquakes have occurred and caused extensive damage to buildings, and often resulted in large numbers of casualties and injuries (e.g. the Van earthquakes in 2011). The vulnerability of the built environment is explained in association with the dominant structure type in the region, i.e. owner-built, non-engineered masonry structure. Here, the term owner-built excludes craftsmen builders, and it is used to refer to builders with no particular construction skill and technical knowledge who generally build with no regard to traditional construction techniques, which indeed require skills and knowledge for quality building. This is to say, most people in rural settings of the region use local materials, i.e. adobe, clay brick, rubble stone,

round timber logs, earth and mud, when building (Spence and Coburn, 1987; Korkmaz et al., 2010; Cetinkaya, 2011; Guney, 2012; Piroglu and Ozakgul, 2013). However, this is the result of socio-economic vulnerability that mostly rural people suffer in the region. In the last decades, construction practice in rural areas of the region has changed though remained of poor quality. The following part elaborates the issue of the vulnerability of the rural built environment through the highlight of the pilot fieldwork.

3.3 The exploratory pilot fieldwork and observations

As will be explained in Chapter 4, to address a set of questions a pilot fieldwork was conducted. The aim was to gain experience in the field as well as to establish an understanding of the changes in the rural built environment with and without the impacts of earthquakes. To explain, as this study entitles post-earthquake permanent housing implementations of the state as the motion of transformation of the built environment, this pilot study was inherently needed in the context of the study in order to facilitate a comparison between the built environment of ‘then and now’. Besides, it was also necessary to understand the impact of the housing implementations from the rural people’s perception because the projects are usually promoted to the poor and low-income. Accordingly, the fieldwork focuses on the settlements that are naturally formed and with the built environment unexposed to imposed transformative implementations of the state. The fieldwork was undertaken between 11th and 19th July 2012 and, in total, 50 villages from the neighbouring provinces of Erzurum, Ardahan and Kars were visited in the study region. During the fieldwork no structured research tool was adopted; indeed, in accordance with the aim of observing the physical characteristics of the built environment, the only documentation tool was taking photographs. Although communication with the village dwellers was not intended, in some cases they approached the researcher, wondering about the purpose of the visit since the researcher was an outsider to their community. Generally, villages located around the same road and near to each other were preferred to visit to save time and to observe more villages. In the end, the pilot fieldwork was most fruitful in terms of exploring the variety in the built environment as well as the traditional construction practice.

In short, the dominant traditional character across the area is stone masonry that is generally built with rubble stone and in some areas with cut or shaped stone. Timber round logs, and also in rectangular shape but rather less preferred, are used for the roof and the roof is infilled with earth. Normally, mud is used for plastering as well as mortar in walls. However, it was widely

observed that mud is replaced with cement and most villagers apply cement plaster as a means of maintenance of their masonry buildings. In this regard, most houses were in better condition than the other kinds of units such as storage, baking room and barn. In terms of using concrete, it was understood that the structural advantage of RC ring beams are known, but mostly applied in a faulty manner due to the lack of technical knowledge and consultation. A number of examples of traditional and non-traditional buildings are presented in Appendix II, including the list of the villages visited, and the following part discusses the observations by referring to the literature.

3.3.1 Traditional built environment

To begin with Erzurum, which is one of three case studies in the research as well, the roof has the most prominent traditional construction practice that is formed by placing timber logs diagonally on top of each other at the corners of a four-wall room (Fig. 3.7). The final form of the roof creates a spacious area as the ceiling is higher and usually looks more ample than a flat ceiling. The top of the roof is used for natural lighting and ventilating as normally the walls of the room do not have any window openings. This type of roofing is called ‘kırangıç örtü’ (kırangıç covering) in Turkish, and it used to be built for living rooms as well as kitchens since they are the largest and the most used spaces in rural lifestyle. However, this practice has long been abandoned due to the lack of craftsmanship and the cost. Despite that timber is a locally available material, the cost of process, treatment and maintenance is comparatively higher than other construction materials for villagers. Hence, only a very few examples are observed and one of them is given in the figure.

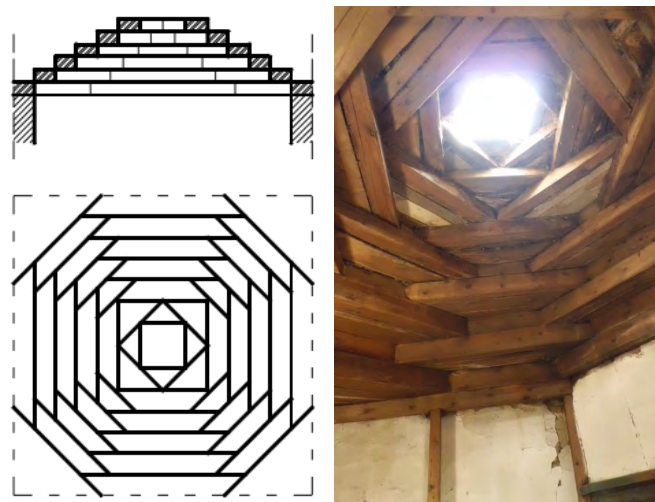


Figure 3.7 Section and plan of ‘kırangıç covering’ (Yildirim and Hidayetoglu, 2006), and a view from a dweller’s kitchen covered with kırangıç built with round timber logs (Author).

As another particular observation in Erzurum, adobe is a local material widely used in construction and usually used together with stone or clay brick when building masonry structures. While most of such buildings are left as barns, storage or an extension of a kitchen, some are occupied as residences. However, compared to stone masonry structures, adobe buildings were in far poorer conditions. In Figure 3.8, a barn built as adobe brick masonry on the stone masonry foundation and a two-storey house – of which the ground floor walls are built with adobe bricks and the second floor is added by faulty use of concrete – are exemplified.



Figure 3.8 An example of adobe masonry barn and a house with an added upper floor on the ground floor with adobe brick masonry walls (Author).

Meanwhile, it is necessary to state that most villagers make use of the ruins of old stone masonry buildings. They use stone particularly as the base of structures they build, or secondarily to build wall fences around their private lot. In this regard, some prefer to keep stones collected ready around their houses.

With regard to stone masonry, Figure 3.9 shows examples of the traditional construction practice. As seen, large and shaped stones are used in the corners and smaller stones are used as masonry. Timber laths are used as lintels. While most of the stone masonry buildings are single-story, two-story examples are also somewhat common in Erzurum villages. Normally, this kind of house has two rooms – one living room and one bedroom; when it has a second story, the living room is designed on the ground floor and two bedrooms are upstairs. Like the practice of the roof, these kinds of stone masonry are no longer constructed; rather, masonry with rubble stone is more widely observed during the fieldwork. It is also understood that in naturally clustered rural settlements, people build their units, i.e. house, barn, storage and other extensions, in a lengthwise layout that are all built by the side of the other. Moreover, they widely consider topography so they settle even on steep hills accordingly.

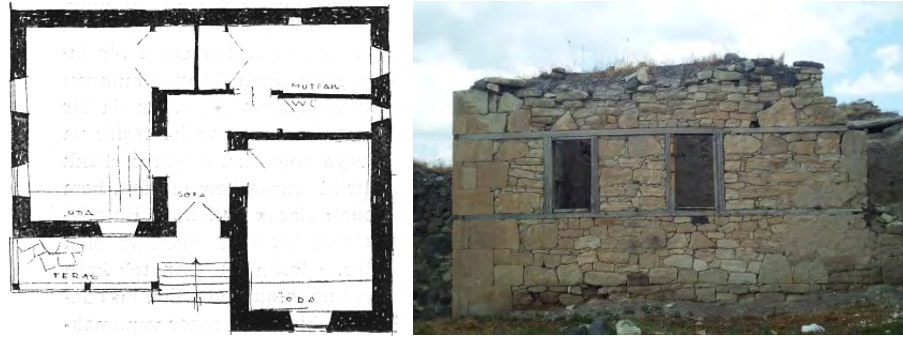


Figure 3.9 Plan of a single-storey stone masonry house (Hotan, 1946) and a view from the ruined wall of a collapsed stone masonry structure (Author).

The practice of stone masonry varies in Kars because cut stone is used as much as rubble stone, particularly for residential buildings. The majority of stone masonry buildings are single-story while few two-story are observed but are abandoned. A roof built with timber logs as post-and-beams and earth infill was the most widely observed in terms of traditional practice. Some houses were well maintained and some house owners even had renewed their roof. In Figure 3.10, an example of cut stone masonry and a renewed roof structure are presented. It is important to note that this type of roof structure is applied for sheltering barns in the region and a high number of barns were observed in Erzurum, Kars and Ardahan. However, they are generally in poorer condition.



Figure 3.10 A villager's stone masonry house built with cut stone and a view of newly built timber post-and-beam roof.

Lastly, in Ardahan, the variety of the traditional practice in stone masonry does not differ from Erzurum and Kars. Nevertheless, no two-story traditional type of building was observed, while a number were observed in Kars and Erzurum. The particular observation in Ardahan was the carvings at the top of timber posts that used to cover the entrance of houses. However, examples of these carvings are only observed in old buildings, and two are presented in Figure 3.11.



Figure 3.11: An example of the carvings on timber posts used in veranda and another example of a carving for the head of a larger timber post, which is an older structure.

In almost all of the villages visited, a number of abandoned masonry structures are observed; some are left as ruins as their stones are reused by villagers when they build new structures. Excluding well-maintained examples, most masonry buildings were in poor condition as they had cracks on the walls, needless to say, due to their structural weight, lack of bounding material and light ground tremors. The examples given in Figure 3.12 show how vulnerable the masonry buildings can be when they are poorly built.



Figure 3.12 An example of masonry structure poorly built with rubble stone and an example of a masonry structure built with cement mortar that is used as a garage; both suffer large cracks in the corners.

3.3.2 *Non-traditional hybrid structures*

In an attempt to build less vulnerable structures and to create better physical conditions for living, rural people heavily make use of non-local materials. Primarily, concrete is the most widely applied material either in mix of other materials or to build a whole RC frame building. However, the way the people build houses with concrete is generally faulty, which even increases the structural vulnerability. For example, during the fieldwork the most widely observed structural fault was the use of concrete blocks on top of masonry walls built with stone and adobe. This was made either to extend the height of storage or to add a second floor as a residential unit. Using concrete blocks in this way is structurally faulty because it increases

the weight on masonry walls, and despite they usually build a concrete ring beam on masonry walls, they do not erect RC columns in corners to strengthen the whole structure. This is to say, even if these types of buildings stand in normal conditions, under seismic forces they are the most likely to collapse, and thereby cause deaths. Besides, the application of concrete ring beams is often inappropriate since it is built discontinuous and with disproportionate sizes. Figure 3.13 provides an example of wall extension with concrete blocks and an example of a two-story house with discontinuous concrete ring beams and columns. A similar structural fault is exemplified on page 291.



Figure 3.13 An example of a barn with faulty extended wall and a two-storey house, of which the second floor is added on the stone masonry ground floor with discontinuous concrete ring beam and columns.

Generally, as observed during the fieldwork, extensions are made whenever house owners can afford. In relation to this, people with higher income, and with more savings, prefer having a house fully constructed as an RC frame. Hence, as in many of the examples above, there were buildings similar to the examples given in Figure 3.14. From the fieldwork, it was understood that some of the RC frame structures were not constructed with technical consultation, and thus, a few were observed with insufficient detailing, beam and column sections with disproportionate sizes, and frames with discontinuous elements. Additionally, in some of the newly built RC frame houses, wall infill was of stone masonry bound with cement mortar. Some buildings were extended with an addition of an RC frame unit as the upper floor while the ground floor is supported with only a couple of highly slender concrete columns (See p: 293). Further, in a few villages, multi-storey applications of RC frame structures were observed (See p: 294). Only a couple of applications of reinforced stone masonry were observed. In two neighbouring villages, two examples of single-storey prefabricated houses were found, one of which already had a small extension added by the owner (See p: 298).



Figure 3.14 An example of RC frame structure with disproportionate and discontinuous columns and beams, and an example of a two-storey RC frame house with stone masonry infill ground walls.

3.4 Discussion

This chapter focused on the rurality concept and stressed the vulnerability of the study region by emphasising the socio-economic characteristics as well as the seismic susceptibility to earthquakes. Based on the rural characteristics and less attractiveness of the region as a result of suffering poverty and migration, the region is deemed as the most disadvantaged within the country. These characteristics are embodied in the built environment of rural settlements as well, which are explored through a pilot fieldwork. The very region-specific traditional construction practice is hardly observable in villages, whereas most people live either in poorly constructed masonry buildings, or in non-traditional hybrid buildings, which have inadequate and inappropriate materials and detailing. The examples of these types of structures are generally as vulnerable as the examples of unreinforced masonry structures. Even if people alter their houses in an attempt to increase the quality of physical conditions in which they live and to reduce the vulnerability of their houses, the results are often far from being responsive in this regard. Particularly, people engaged with urban living, also who occupy their village houses only seasonally, alter their houses in the first place. Contrarily, the poor continue living in poorer conditions as they cannot afford any kind of interventions.

The introduction of concrete into rural areas as a non-local material is the result of the motion of urbanisation that is globally considered as a measure of modernisation. Indeed, this is also the reason why rural people in the region alter their houses as soon as they can afford. Hence, as learnt from the pilot fieldwork, having a house built as a reinforced concrete structure does not only make a home for the owner, but also is a measure to express their economic status. In other words, even though the traditional construction practice is valued in literature, by academics, it is not preferred by villagers as much as it used to be.

Particularly, it has been highly ignored by the authorities; and, as stated in Chapter 1 and as will be explained through the examples in Chapter 2, highly standardised RC frame houses have been implemented following earthquakes, which have apparently removed the real characteristics of the rural built environment. Besides, as these housing projects are implemented after earthquakes, it draws an image in the perspective of villagers that the material used, concrete, is the ultimate to create a seismic-resistant as well as modern looking house.

Finally, the pilot fieldwork enhanced the content of the study by making the following two assumptions: rural people in the region are strongly familiar with the material and wish to live in a house built so; and, in relation to this, the post-earthquake housing implementations are welcomed by villagers as they are delivered a house they wish to have. Accordingly, as this chapter has explored the traditional characteristics of the construction practice in the area, the Chapter 5 focuses on the case studies of the post-earthquake permanent housing implementations in Erzincan, Erzurum and Van in an attempt to highlight the extent of the changes in the rural built environment.

Chapter 4

Research methodology

This chapter outlines the methodological development of the study. It starts with a review of the theoretical strengths of research methodologies and a discussion on the methodological approaches in disaster studies. The research design of the study is outlined and the progress of the research is discussed through methodological preferences and decisions regarding fieldwork and case study approach. Data collection and data analyses are explained. A discussion on the trustworthiness of the research followed the focus on ethical considerations underpinned the process of data collection.

4.1 Theoretical underpinning to the research methodology

Knowing the theoretical perspectives in behind and the practical strengths of research methodologies is not only necessary to shape research process, but also guides researcher to conduct the study in a justifiable manner by ensuring the methodology preferred is appropriate to the research in question and the methods are compatible with the methodology and to gather accurate data to produce the knowledge from. Basically, what shapes the research process starts with the epistemology. It is the philosophical ground of theoretical perspectives encompassing the tools to produce the knowledge (Gray, 2014). With the words of Crotty (1998, p: 8) it is “how we know what we know”; thereby, it is deemed as a toolkit to reach the knowledge (Maxwell, 2011). Three types of epistemology are objectivism, subjectivism and constructionism. Objectivism is the philosophy underlying quantitative research, which is positivist and generally experimentalist; subjectivism, in contrast, underlies qualitative research, which is structuralist and often interpretivist (Holden and Lynch, 2004). Differently, constructionism is as a medium that brings both together by blending their views in an inseparable and reasonable way. Constructionism values the different meanings relatively constructed by different people even if they are exposed or focus on the same object. Therefore, from this viewpoint, constructionism is far from being objective, but also not simply subjective (Crotty, 1998). Despite the fact, constructivist view is generally employed by researchers in the field of qualitative studies and often referred social constructivism as a

research philosophy (e.g., constructivist grounded theory) (Crotty, 1998; Mills et al., 2006; Andrews, 2012). Social constructivist researcher values the diversity of meanings created by subjects, i.e. participants. Hence, this kind of research takes place in their natural settings, and usually recognises their historical and cultural background (Creswell, 2009).

Following the epistemology, theoretical perspective guides a researcher to decide the direction of research, and in the end, the methodological approach to conduct the study compatible with the research aims and objectives. There are two types of methodological approach: inductive and deductive, respectively acknowledged as qualitative and quantitative studies (Gray, 2014). However, these approaches are found limited by the pragmatists as both narrow the options of methods that can be employed to conduct research. The pragmatist view has the roots in 19th century; however, after 1990s it has become more preferable by the researchers as it has been clearly defined as the philosophical stance behind mixed-methods research (Creswell, 2009; Gray, 2014). In pragmatism, the research problem is the core that the researcher makes use of any appropriate method to approach and develop the related knowledge. The pragmatist view sets free a researcher to choose the most appropriate methods of qualitative and quantitative research according to the specific needs in a research (Creswell, 2009). Hence, in a mixed-methods research, a combination of the methods either sequentially or concurrently conducted, and they usually are embedded or transformed into the other. It also allows researcher to merge, converge or keep the datasets separate.

With the pragmatist view in behind, a researcher is also free to select either one particular case to study or a set of cases in particular to a phenomenon. By doing so, he or she aims to investigate the case or the phenomenon in all extent by providing multiple source of evidence (Stake, 1995). This type of research methodology is called case study, and it allows the researcher to bring different types of data together in order to investigate the case, or the phenomenon, from a holistic approach. To say, a researcher can employ structured interviews as well as open-ended and direct observation as well as non-participant. A researcher may also make use of archival records to provide background to the case (Scholz and Tietje, 2002). Therefore, a case study can include statistical data as well as verbatim quotations as the participants' personal views (Stake, 1978). In this sense, case study takes the advantage of the diversity of research methods, and it is often conducted quite extensively by researcher. It can be adopted for exploratory purposes as well as explanatory purposes (Stake, 1995, 1978).

Having said that, a researcher should have particular motivations and objectives that can answer the question of “why employ more than one kind of data in a single study” (Small, 2011, p: 63), and should be able to clearly state how their combinations will fit to the objectives of research (Creswell, 2014). Firstly, in case of a research with more than one research questions, then the researcher may need to employ different methods as one type of method can be useful for one of the questions, and the other methods can meet the needs of the other questions (Gray, 2014). Secondly, a researcher may like to “enhance confidence” (Bryman, 2011, p.1142) in his or her research findings by employing more than one method and by triangulating the methods or the data. Thereby, the researcher aims to collect different types of data via different types of research methods to better validate the research by providing complementary or confirmatory data. Campbell and Fiskel (1959, p: 81) strictly defend to employ “more than one trait as well as more than one method” for the validation of research and its process. This is to say, mixed-methods research inherently comes with the opportunity of strengthening the study via triangulation (Jick, 1979).

4.2 Methodological approaches in disaster studies

As elaborated in Chapter 2, the focus has moved to social vulnerability paradigm when interpreting the effects of natural disasters. This paradigm values both pre-disaster and post-disaster conditions, and conceptualise them as a whole with the aim of bringing better understanding to disaster recovery. For that reason, and because of the nature of disaster, fieldwork is deemed the inevitable research method in disaster studies (Stalling, 2007). Methodologically, the first argument is that disaster studies heavily depend on qualitative research methods as the most widely employed techniques are case study (location or event focus), interview with survivors (narrative or focus group), and observational documentation from the field (notes or visuals) (Phillips, 1997). The second argument is that disaster studies often suffer deficiencies related to validity and reliability of their data since they are found too specific to study location and sample. In this regard, Stallings (2007) strongly emphasises that disaster researchers inevitably follow non-probabilistic sampling since they seek the perspective and experience of particular communities representing a larger population affected by a disaster. He suggests that generalisability is an issue that can be overcome by studying a second and, maybe, a third case in an attempt of replication and increasing the sample size. Besides, Stallings (2007, p: 64) also argues that “descriptions of conditions, procedures or typical activities before disaster serve as the logical equivalent of a control group”, which eventually helps to establish a baseline to compare the conditions with research data, i.e. post-

disaster conditions. Killian (2003) emphasises the fact that disaster studies should be designed in a way of hypothesis-oriented; that is, the order of data collection and the variety of data to be used should construct the base either to test or to formulate a hypothesis, just as preferred in any social research. Accordingly, Killian suggests that a disaster research should consist of two parts; the first one is the descriptive research that provides background to the disaster-specific case and the second one is the collection of empirical data that lead further exploration of variables and relationships foreseen or unforeseen through the hypothesis.

Lindell (2011) puts stress on the need of the integration of inductive and deductive approaches as he implies that disaster studies should engage mix-methods research in confirmation or disconfirmation of the variables measured whether they form a chain of cause-and-effect or not. In his words, “such analyses greatly enrich our theoretical understanding of the phenomenon being studied” (Lindell, 2011, p: 13). Yet again, Killian (2003) implies that the method chosen for collecting data should be open-ended to some extent not to limit the exploration of the unexpected. Referring the purpose of confirmation in employing mix-methods research, Stallings (2007, p: 64) mentions triangulation as the most advantageous method “in one-shot field studies” as he points out the importance of finding consistency in different types of data when they are triangulated. Thus, Stallings argues that triangulation together with replication sufficiently address the generalisability of a disaster research.

Having these motivations, employing both qualitative and quantitative research methods to collect empirical data from the field has notably become a favourable methodological approach by disaster researchers. For example, Ophiyandri (2013), Hidayati (2013), Mohapatra (2009), Bosher (2005) and Dikmen (2005) conducted their studies through multiple-case study design and generally made use of data collection techniques including questionnaire, semi-structured interview as well as focus group interview, direct observation, and social mapping. Thuraiajah (2013) and Samwinga (2009) also collected their research data through interviewing and questionnaire, but did not study in a case study design. Loureiro (2012), Pasupuleti (2011) and Jigyasu (2002) conducted their research through case study design, but only adopted qualitative methods to collect their data. Nevertheless, they all made use of triangulation in the end of their research - some for confirmatory purposes and some for complementary purposes- to address validity and reliability concerns. Besides, the referred researchers strongly emphasised the need of flexibility in their research process as their main rationale at deciding to adopt mixed-methods research strategy for their studies. These examples also proved that a disaster study is a multi-phase research that the researcher

inevitably visits the field at different stages of the study to address different purposes, such as to decide the most appropriate areas and settlements for sampling, to collect preliminary data, to refine research methods and to pre-test survey tools. Furthermore, mixing research methods in a multiple-case study design and conducting fieldwork as a disaster research strategy is not only preferable among doctoral students. For example, a group of expert researchers in the project team of CURBE (2010) completed their fieldwork in Thailand and Pakistan by conducting key-informant interviews, household surveys, focus group discussions, imagery analyses including mapping and photographing as they sought key indicators in disaster recovery and evaluated the achievements in recovery. The overview of the methodological approaches in disaster studies has also influenced the research design of this thesis, which is explained in the following part of the chapter.

4.3 Research design

The research design of this study is shaped through the steps illustrated in Figure 4.1. The research aim and objectives are based on a regional scope to bring an understanding of vulnerability of the target study area and the population. Accordingly, a fieldwork approach is adopted to carry out the study and then the spatial and temporal dimension of the research are defined in addressing the research aim and objectives as well as to design a multiple-case study. With the aim of addressing the concerns of validity and reliability of research, the research tools both from qualitative and quantitative strategies are employed. Having made the decision with regard to the research methods, the design and the role of each data collection tool is thought carefully and their content and context are developed accordingly.

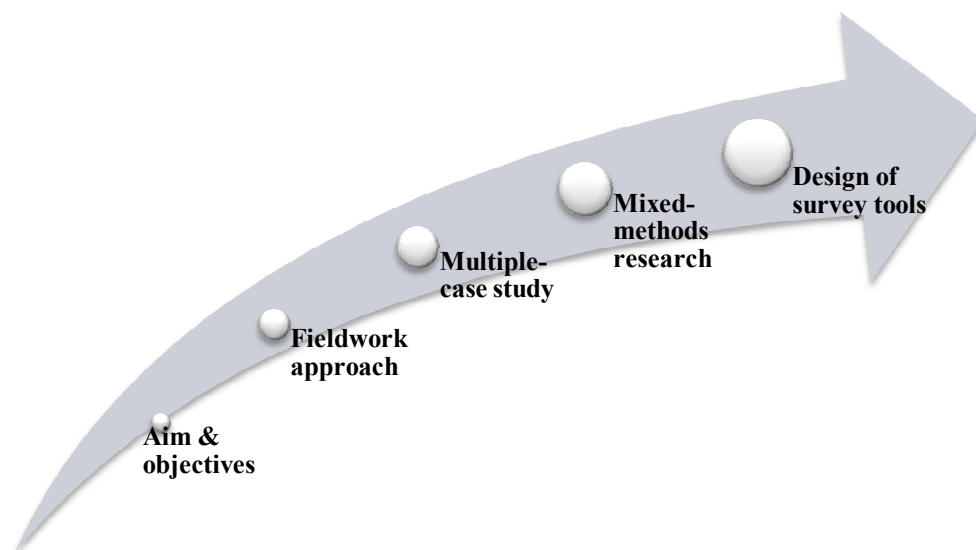


Figure 4.1 The flow of the methodological development of the study.

4.3.1 Fieldwork approach and case study method

Fieldwork requires a set of criteria to meet on a logical base (Burgess 1982; Kapila & Lyon 2006). In the preparation of fieldwork, the questions such as which area should be studied, how many areas should be visited, how the community should be sampled, should the sample be a large survey or a collection of a specific case, should the areas or communities be comparative or contrasting and what type of pre-field skills required (Kapila & Lyon 2006; Killian 2003; Burgess 1982; Fiedler 1978), are also the concerns overlap with that of case study design. Conducting an effective case study needs having prior experience and knowledge in fieldwork that can be acquired through a pilot study. The idea of pilot study is also pragmatic (Nunes et al. 2010). Have pointed the significance of fieldwork in disaster studies and the relationship between fieldwork and case study approach, the researcher conducted fieldworks at three different stages throughout the study, which was also the progress seen in the studies of Jigyasu (2002), Boshier (2005), Mohapatra (2009), and Pasupuleti (2011). Briefly, the first two fieldworks were the phases of preparation in terms of learning and gaining experience, and accordingly the third phase of the fieldwork was designed in a way to ensure that the data collected would provide valid data and lead the study towards an accurate conclusion. The three-phase fieldwork approach of the study is illustrated in Figure 4.2 and each phase is explained in detail.

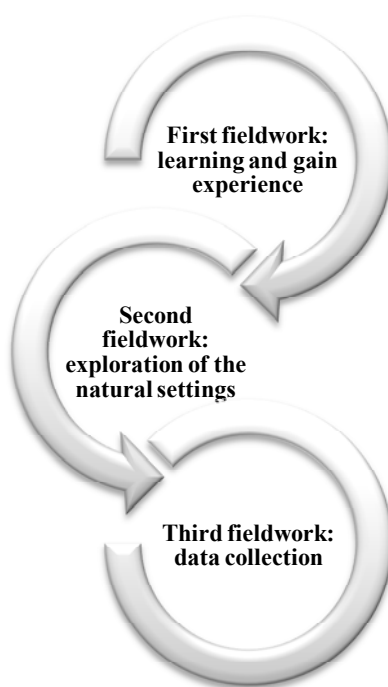


Figure 4.2 The three-phase fieldwork conducted throughout the study.

1st Phase of fieldwork: Joining the reconnaissance team

This phase took place between 19th December 2011 and 25th December 2011, in the very early stage of the study. Following the 2011 earthquakes in Van, the CAT took the initiative with the support of the local governing body and announced a call for volunteered architects to assist the damage assessment surveying of the buildings in the areas affected including urban and remote rural settlements. In total, 120 architects worked in surveying scheduled between 28th November 2011 and 25th December 2011, which was a framework spread over four weeks. In the last week of the schedule, the researcher joined a reconnaissance team consisted of three architects, excluding the researcher herself, and one construction surveyor, from the ministry. A number of reconnaissance teams, 4-5 members in each, were listed by the CAT and their target survey areas were assigned by the officers of the local governing body. The teams completed surveys in 13 boroughs and one district including a village. The reconnaissance team the researcher worked with conducted surveys in the village of Ünseli of the Muradiye district (Fig. 4.3), which is situated at the 80 km north of the city centre of Van.

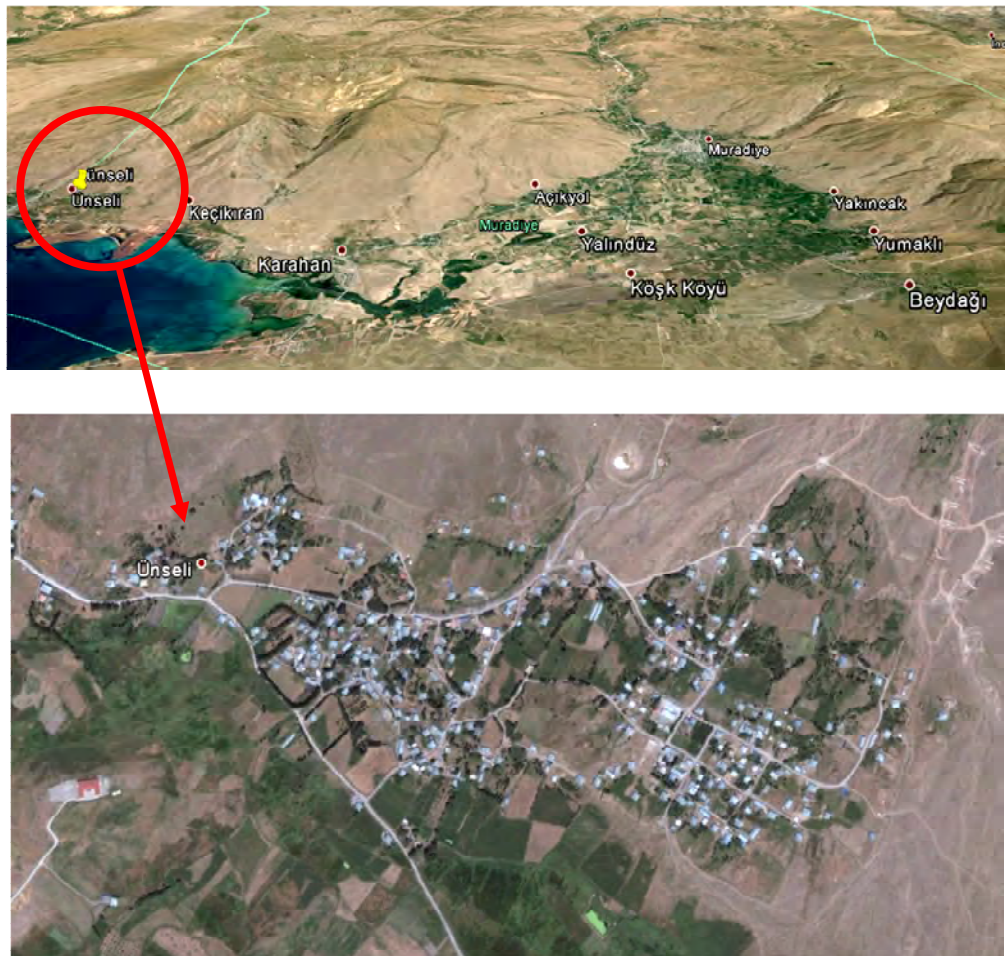


Figure 4.3 The Muradiye district in Van and the satellite view of the Ünseli village (Google Earth, 2013).

On the day of landing in Van, 19th December, all of the team members were taken into a half-day training by the officers, who explained how to assess the damages in buildings, how to rate the level of damage, how to fill the form and how to report the final forms. The following day the teams started to work in the field. During the four-day long damage assessment surveying in the given village, structured forms given by the officers were used and all of the completed forms were entered in MS Excel format in the end of each day. In the last day, the forms were printed and signed by the each member of the reconnaissance team, and then they were delivered to the head officers. However, the method of damage assessment was merely dependent on visual observation of the conditions of the buildings. Hence, the method and forms were found inadequate for such purpose (*See Yilmaz et al., 2013*). The EERI teams also pointed the issue with regard to the lack of efficient assessment methods (EERI, 2012). Moreover, in some cases, the assessments were quite random as they were actually made based on the poverty conditions of the families, since this was an opportunity for them to get a new house. On the other hand, as the area of the fieldwork was in the vicinity of the 1976 Çaldıran earthquake in Van, a few examples of the post-earthquake permanent houses built after the disaster were observed, which also provided a preliminary idea about how the practice of post-earthquake reconstruction was then and now, and how much the projects addressed the needs. However, most of the examples were either abandoned, or poorly modified in attempt of maintenance or extension.

Needless to say, this preliminary fieldwork was clearly an opportunity not to be missed for the researcher remembering that Killian (2003) strongly suggested making a preliminary reconnaissance as immediately as possible after the disaster. Thus, the fieldwork was highly fruitful in terms of gaining practical experience in post-earthquake damage assessment surveying, gaining preliminary and solid understanding of the issue of rural settlements, their susceptibility and the dwellers' vulnerability, and observing both practically and theoretically lacking approaches of the state to post-earthquake reconstruction.

2nd Phase of fieldwork: Exploratory pilot work

With the gain of the first phase, the focus of the literature review was narrowed and the review was made critically since most of the resources found either pointed the value of the vernacular architecture as heritage, or introduced novel engineering techniques involving the use of locally not available materials or financially not applicable construction techniques. However, not many indicated the contemporary rural built environment, which mostly consists of non-

engineered buildings, built from mix of materials that of the owners can afford (often mixed with poor quality of cement) and randomly collect from the surrounding landscape. This kind of buildings are neither a piece of vernacular architecture nor able to stand against earthquakes, which cause life losses indeed. The vast majority of the buildings surveyed during the damage assessments in Van were in this category. Nevertheless, given the limited resources in the literature and the fact that such understudy area methodologically cannot be exemplified based on a single village, a second fieldwork was necessarily conducted to address the following questions:

- i- What are the characteristics of construction practice in the rural built environment of the study region?
- ii- To what degree the identity of vernacular architecture had been carried today, or how severely it had been replaced by non-vernacular and non-engineered building techniques?
- iii- How the examples of construction practice differed across different provinces and remote rural settlements within the study region?

Although the questions borne in mind were naturally more about the contextual background of the research problem of the study, the second fieldwork was also explorative in terms of understanding the constraints such as time, budget and self-performance. Given the fact that the first phase was a collective work that was organised and carried out as a group work, the second phase of the fieldwork was also to gain an understanding of the challenges in the field that might hinder the progress of a lone researcher in the field, and thereby possibly would affect the methodological development of the research. Thus, the following methodological considerations were borne in mind:

- i- How well the pre-field schedule would be achieved with the progress on-site?
- ii- What is the role of the researcher's own performance and the accompanying people? (the researcher's father and local driver recruited through rent a car)
- iii- What are the possible ways of collecting valid and reliable data (i.e. to what extend the surveys and interviews would be fruitful)?

The fieldwork took place between 11th July 2012 and 19th July 2012, during which 50 villages were visited in three provinces including Erzurum, Kars and Ardahan in the study region. The list of the villages and their locations are presented in Appendix III. The process in the field was left as flexible as possible and the researcher aimed to observe the built and pastoral

environment of the villages. Expectedly, the learning from this phase was invaluable in terms of addressing the questions above. Additionally, it also enriched the source of evidence for the study as the rural built environment was photographed by the researcher herself - instead of relying merely on the literature sources- and the naturally formed rural settlements were experienced. The contextual learning from this phase is particularly used in Chapter 3, which discusses the domination of non-engineered buildings over the vernacular architecture with the impact of modernisation. In the end, the first fieldwork followed with this second fieldwork guided the methodological choices made towards the third phase of the fieldwork, which was designed for the data collection. Theoretically, the first two phases of the fieldworks conducted also addressed the suggestions of Stallings (2007) and Killian (2003).

3rd Phase of fieldwork: Data collection for the case studies

Almost a-year-long intense preparation was carried out for the third phase, which was the phase to collect the first-hand data to be analysed in the end of the research. The preparation included the refinement of research design, the selection of the case studies, the selection of data collection methods, and their development and refinement. In relation to the methods chosen, obtaining the ethical approval to conduct the research in the field was also a part of this preparation. The selection of case studies was critical in terms of achieving the aim of the study. That is, the study does not simply aim to focus on the impacts of earthquakes. Rather, it aims to develop and illustrate a coherent relation between the changes in communities and built environment affected by earthquakes in the baseline of transformation and adaptation. It was also believed that constructing a multiple-case study with only two cases would not link the findings as better as a multiple-case study with three cases would. This is to say, the findings from a two-case study might have a serious gap at relating how slowly or rapidly the changes occurred and how provincial or regional dynamics are influenced. Accordingly, a time frame of 20 years was decided to study with three cases given in Figure 4.4.

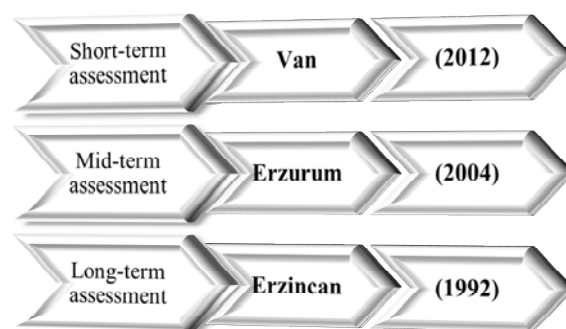


Figure 4.4 The case studies selected for the research and their significances in the timeframe set to study.

The fieldwork was conducted between 25th August 2013 and 5th September 2013, which started from Van, continued in Erzurum and ended in Erzincan. It was preferred to begin the fieldwork from Van since the researcher had a familiarity with the area and made necessary contacts easily to begin the fieldwork. The recruitment of the local driver was arranged before stepping into the field with the help of the architect, who was met during the damage assessment surveying in Van and who also helped in the content-check of the questionnaire. Accordingly, without losing time, on the day of the landing in Van, the village visits were begun. Despite the fact that almost one and a half year passed since the earthquakes, the reconstruction was still in the very early stages in some villages, and some did not have large number of reconstructed houses (e.g. the village of Bakraçlı). Hence, the driver recruited, who also worked for the Caritas project in Van, took the lead and contacted his friends on phone immediately to check the villages suitable for the purpose of the study. In the end of the first day, finally the fieldwork plan was back into the route and the data collection was started with the beneficiaries resettled in the post-earthquake permanent houses.

In the following three days, data collection was carried out smoothly as planned, and finalised in the village of Topaktaş on 28th August 2013. The next day, the researcher and her accompanying father took the bus to leave for Erzurum, which was a journey lasted for six hours. In the same day, a local driver was recruited for the fieldwork in Erzurum and he was explained about the purpose of the study and given the names of the villages planned for visit. The following day, on 30th August 2013, the fieldwork was started from the village of Çiğdemli. On 1st September 2013, the fieldwork in Erzurum was completed in the village of Paşayurdu. By the evening of the same day, the researcher and her accompanying father left for Erzincan by bus with a journey less than three hours. Similarly, a local driver was recruited and was explained about the purpose of the study and given the names of the villages planned to visit.

However, given the fact that more than 20 years passed since the earthquake in 1992, some of the villages listed were removed by the suggestions of the driver as they either were not suitable for the study since they have had become districts just nearby the city centre of Erzincan, or were quite far that might have been time consuming to travel to. Thus, yet again, through the contacts the driver, few villages were decided to check in the place of the removed ones for the fieldwork. The following day, on 2nd September 2013, the fieldwork was started from the village of Saztepe, and followed by the village of Altınbaşak, where the driver's uncle lived. The only interviewed participants in Erzincan were also the driver's uncle and his wife.

The fieldwork was completed in the village of Bayırbağ on 4th of September 2013, and the researcher and her father took the return flight to Istanbul in the following day.

4.3.2 Mixed-methods research design and the inquiry tools

There are a number of mixed-methods research design defined according to the phases of data collection, the weight of one method over the other, the aim of mixing and the method of mixing. The current study adopts embedded design. More explicitly, according to the classification of Creswell (2011, p: 95), the name of the design is “embedded mixed methods case study”. Creswell suggests choosing this type of mixed-methods research when there is an inadequacy of sources to obtain qualitative and quantitative data equally, when the researcher has limited time to collect data and if one type of data has a priority over the others.

The primary source of data of this study is the participants, i.e. the villagers living in post-earthquake permanent houses built by the state. Accordingly, the methods available to acquire the data are questionnaire surveying, as means of quantitative inquiry, and interviewing, as means of qualitative inquiry. Considering the time required for collecting interview data and questionnaire data, and the time and budget limitation to conduct the actual fieldwork, the priority was given to questionnaire since it allows reaching a higher number of participants in a shorter time compared to that with interview. Besides, if the questionnaire content is developed in consideration of all of the possible issues and variations regarding the study context, then the use of questionnaire can assist to generate a large amount of data, which can be processed through methods of data reduction, i.e. statistical analysis.

As another rationale Creswell defined to conduct a mixed-methods research, the researcher has less experience of interviewing, which means the researcher might be affected by interviewees, or vice versa. In such case, the accurateness of data collected might not be as high as desired for the study. Have considered these factors, it was decided to conduct questionnaires primarily, and interviews as a follow-up process with a few of the participants. Nevertheless, this does not suggest that the interview data are overlooked in the study. Indeed, this is to balance the understanding drawn through data deduction with more personal insights. A final highlight to make regarding embedded design of mixed methods research is that the separate datasets are not necessarily merged or converged, unlike in other models of mixed methods research (Creswell, 2011, p: 95). The mixed methods model adapted in the study can be illustrated as shown in Figure 4.5. The study also widely utilise secondary data as literature as well as various national statistics, and observation as the researcher’s direct observation during

the fieldworks carried out at different stages of the study. Using various research methods brought inductive thinking as much as deductive thinking into the research. Following the figure, the inquiry tools are explained why they are employed and how they contributed to the study.

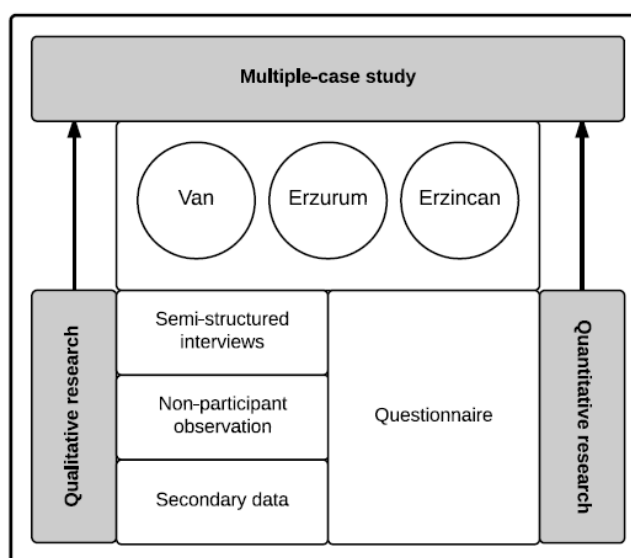


Figure 4.5 The embedded mixed methods case study model of the study.

Questionnaire

Questionnaire is a highly structured and systematic interviewing survey tool, which is the most commonly preferred quantitative research method in community-based participatory research. It is also the favourable form of collecting data when the aim is to make comparisons between different groups sampled in a study (Sapsford, 1999; Moore, 2000). This is simply because of that questionnaire is a very standardised form of asking same questions in the same order to each participant in a study so that the participants' responses are collected in the same closed format (Payne and Payne, 2004), which eventually makes the data thoroughly comparable (Bird, 2009). Using questionnaire as a survey tool comes with several essential concerns that need to be precisely addressed. The primary concern is the design of questionnaire, which involves the richness of content and the structure of format. Basically, due to its structured format, it is often not possible for the researcher to discover something beyond the content (Sapsford, 1999). In order to increase the content relevancy and quality of questionnaire, it is generally suggested to consider why each question is being asked, what the expected answer is and how it would contribute the research (Sapsford, 1999; Adams and Cox, 2008). Structuring the format involves wording questions, categorisation of questions and length of questionnaire,

types of questions and response format, using scales and categorical data, and order of questions. Besides, deciding sampling method and sample size, choosing the appropriate mode of delivery and administration of questionnaire are also the essential concerns need to be addressed (Oppenheim, 1992; Sapsford, 1999; Bell and Opie, 2002; Bird, 2009). The development of the questionnaire is explained in the following section of the chapter.

Semi-structured interview

There is a variety of interviews depending on how they make the query and how they are conducted. In this study, face-to-face semi-structured interview is the type of in-depth interviewing employed, which is conducted with 35 interviewees in total. In-depth interview aims to “collect narratives or personal stories of participants”, which is in contrast with focus group interview that collects “a range of opinions from participants” (Hennink et al., 2011, p: 111). Conducting a semi-structured in-depth interview means that the researcher follows an interview guide, which includes only a few open-ended questions that would help the researcher to probe the conversation with the participant as well as to obtain in-depth answers to elaborate the issues questioned (Payne and Payne, 2004; Hennink et al., 2011).

Using questionnaire as a survey tool in the first place and in-depth interview as follow-up explanation tool in the second place is another opportunity of mixed-methods research design (PREST, 2004; Creswell, 2014), which is the methodical strategy of this study as stated earlier. Taking the advantage of conducting the interviews as face-to-face, it was also easier to establish the rapport with interviewees, to waive the questions not applicable for the exceptional cases of interviewees but to ask further clarification for the remaining questions, to observe whether the question is too sensitive or whether the interviewee started feeling uneasy to continue the interview. However, conducting face-to-face interviews costs time and money since it requires additional effort in the field and for transcription of audio records before analysing. To minimise the time consume, firstly, the number of interviews was limited with a quota less than the number of the questionnaire. Secondly, the length of the interview was also kept short with only ten questions (can be seen in Appendix II) produced to highlight the certain themes in the questionnaire. This approach also simplified transcribing the records, their analyses and the translations of the abstracted parts according to the themes. Considering the method of the fieldwork conducted for the research, the interviews did not cost any additional expenditure as the interviewees were already the questionnaire participants.

Observations

Observation is another qualitative research method employed in the study. During the fieldworks (all of the three phases) the researcher took notes for herself later to use as thick description regarding the spatial and societal settings of dwellers in the villages visited. Observation methods are more flexible than any other data collection methods. With regard to the use in the current research, during the second phase of the fieldwork - the exploratory pilot fieldwork in Erzurum, Kars and Ardahan- the researcher followed an unstructured way of taking notes and photographs. That is, the researcher's observation (non-participant) was not systematic and not recorded through any device or structured paper format. Rather, it was type of "the community walk" (Payne and Payne, 2004, p: 158), which is the technique that the researcher walks through the study community or location together with a community member, who describes the social setting and the usual activities that takes place as the researcher asks about certain things that are observed during the walk (Hennink et al., 2011).

Doing so helped better engagement with the physical surrounding of the people and their socially constructed within-community relations as well as to feed the loop between the literature review and to strength the contextual and methodological development of the research. During the third phase of the fieldwork, the observation notes were more about the specific issues raised by participant during the surveys, and also about the physical environment built after the earthquakes. For example, in some villages sampled, the location of the houses implemented appeared randomly selected since the settlement hardly had the characteristic of a well-planned village. Further observations in this sense are noted in the related appendix of the case studies.

Secondary data

The use of secondary data was essential for the study, and not only for the purpose of reviewing the literature, but also required as supplementary data along with the primary data collection. A variety of secondary data is used when comparing the transformation of settlements and in the evaluation of the improvements in the competency of the state in terms of reconstruction approaches and development of housing implementations. For example, the doctoral thesis and papers as part of the literature sources helped to understand the reconstruction process adopted in the earlier implementations. The websites of the local news and local unofficial civil societies helped to gather the background information. Through the search in the Google Earth, the relocation site and the former site of the villages were studied

which also helped to better evaluate the decision of the relocation. Collecting secondary data was also useful as it provided further justification from diverse resources completely free from the biased or empathic interpretation of the researcher and the personal reflexivity of the participants, which increased the reliability and neutrality of the study in the end. The approach of combining secondary data with primary data is deemed a highly practical strategy in producing efficient, accurate, and thus, useful monitor, assessment and evaluation of the study subject (Green, 2012). The secondary data are used to develop the general context of the research as well as specifically to better examine and visualise the case studies.

In addition, a small set of secondary data obtained from the official website of the Turkish Statistical Institute (TUIK) are used to enrich the illustration of the case studies. The data obtained include the national census of particular years for the provinces and the population of the settlements studied, the literacy and education rates, and the migration flow for the case study of Van.

4.3.3 Design of the questionnaire

Questionnaire is the primary structured data collection tool of this study and an evaluative approach was brought in its design. The contextual and structural developments of the questionnaire are explained in detail to clarify how the indicators to be measured are selected. Basically, a number of studies overlapping with the aim of post-occupancy evaluation of the study are reviewed with regard to various housing development projects.

4.3.3.1 Evaluation concept

As discussed in the literature review, the latest models of disaster management and mitigation illustrate a learning loop within and after a case; that is, a loop to draw lessons from the actions taken and the plans and projects implemented in the wake of a disaster. An illustration by IFRC (Fig. 4.6) more explicitly defines how to phase this loop in practice by referring an evaluation phase after the implementation phase. In this regard, evaluation is considered a broad learning process aiming to provide a better basis to improve future implementations. By that means, evaluation is a summative assessment and functions as a gauge that displays the effectiveness of the measures taken to fulfill the objectives of a project, programme or a policy. In short, evaluation is to critique the performance by exploring the impacts (UNCHS, 2001; OECD, 2002; IFRC, 2011).

In the framework of IFRC, an emphasis was put on the context and method of evaluation with the respective questions of ‘what to evaluate’ and ‘how to evaluate’. In relation with the first, it is important to understand which features of the implementations are tailored to the specific conditions of the disaster, the area and people affected, the coherence between the needs and the promise of the implementations. In relation with the latter, in post-disaster recovery projects, the participatory approaches in evaluation are appraised invaluable as they allow the beneficiaries’ input, which provide a transparent and accurate view on the relevancy and efficiency of the deliverables (UNCHS, 2001; IFRC, 2011). Furthermore, with regard to the given how and what questions, a variety of evaluation concepts can be adopted depending on aim, time and focus. Speaking of post-disaster reconstruction projects, post-implementation reviews (PIR) can be conducted to evaluate how the objectives and achievements overlap, and post-occupancy evaluations (POE) can be conducted as well to assess to what extend the implementations serve the need of the beneficiaries.



Figure 4.6 The interrelated phases of assessment, monitoring and evaluation in the context of post-disaster implementation planning (IFRC, 2012, p: 58).

As both are ex-post evaluations, they outline the factors leading to success or causing failure (IFRC, 2011; Efficiency Unit, 2009; OECD, 2002). Accordingly, an evaluation requires a structure that includes indicators purposefully selected in order to measure the consequences of the implementations. To say, indicators are either qualitative or quantitative factors that assess the changes occurred in association with the implementations (OECD, 2002). Given the fact that the implementations of post-disaster reconstruction aim incremental changes in terms of reducing the vulnerability, an evaluation in this context aims to outline the key performance indicators, which demonstrate what critical success factors directly or indirectly contribute the achievements of the relevant implementation (ZeePedia, n.d.). Nevertheless, as discussed in Chapter 2, addressing the vulnerability reduction is a multi-faceted process that ideally considers social, economic, cultural, institutional aspects as well as the physical aspects (e.g.

the PAR model). Therefore, the success factors in this kind of implementation should not be sought merely through the physical interventions. Rather, it should include the indicators seeking the impact in each given aspect. In this context, Da Silva (2006, p: 46) also wrote: “when evaluating the impact of a programme, outcomes rather than outputs are more effective indicators”. Herewith, Da Silva suggests that an evaluation should be inclusive with a perspective of future rather than just looking at the number of the houses reconstructed and the occupancy rates by the beneficiaries.

Having said that evaluation is more than assessing the houses implemented, it should focus on measuring the interrelated issues instead of measuring each discretely. To this end, following the preparation of an evaluation plan, developing indicators to be included and organising them in an entirety are the essential steps (UNCHS, 2001). In this study, questionnaire is the tool to conduct the evaluation, which is planned as a mix of PIR and POE. Conceptually, since POE investigates the users’ satisfaction with their physical environment, in the context of this study, the beneficiaries’ satisfaction with their houses and settlements are measured as a means of POE. Through PIR, the beneficiaries themselves evaluated their social and economic circumstances with regard to the impacts of the disaster they experienced and also evaluated the approach to the post-earthquake housing reconstruction. Accordingly, the development of the questionnaire is continued with the specification of the indicators appropriate to the concept of the evaluation adopted and to the context of the study: adaptation and transformation.

4.3.3.2 Selection of indicators

The indicators are selected based on the key aspects gained through the literature review. In addition, observations from the pilot fieldwork as well as the review of the previous studies in similar context contributed to the selection of the indicators explained as follows.

Demographic indicators

The indicators defined under this category are used to illustrate the background of the participants, to gain a preliminary understanding of their earthquake experiences, and also to relate to further issues by seeking whether there is a relation with other indicators defined under the other categories of the evaluation. To begin with the number of households and children, it often takes place in most of the surveys as it is the way to obtain data regarding the family size. This is more critically important when evaluating a housing project since it has a likely relation with the size of the house and its spatial organisation, e.g. number and size of the rooms.

Previous studies focused on various housing developments have outlined this relation (Behloul, 1991; Zappettini, 2001; Dikmen, 2005; Darkwa, 2006; Barenstein, 2006; Korkmaz, 2006; Tercan, 2008).

With regard to the age groups of the participants, as discussed in the literature review, elder people – generally categorized above 65- are deemed more vulnerable than the others as they are deemed under higher risk of life loss, e.g. due to being unable to evacuate the building in case of an earthquake, and low-income, e.g. dependency on the help from others. Besides, in the rural context, the aged population is also deemed more attached to their places than the young population is since they are usually attracted to the urban to establish their lives¹⁹. Accordingly, the age groups also serve to find further relations with the other indicators; for example, with the dependency on agriculture, tendency of leaving the houses and the satisfaction with the house.

Educational attainment is also another demographic indicator most widely collected in surveys. It questions the level of education a participant has completed. This indicator is important as it is used to illustrate the literacy rate and continuity in schooling (e.g. in Tercan, 2008) and is also usually evaluated in relation with employability, which leads to income level (e.g. in Darkwa, 2006) and population increase (e.g. in Demirli, 2011). Besides, in the rural context, employability increased with the higher education may play a role in the flow of migration to urban areas, which can also be found in relation with age. In the questionnaire, this indicator is included to explore the relation latter explained.

Type of occupancy and length of occupancy have different inputs in understanding the people's relation with their residences. For example, house-owners are found more attached to their physical settings, i.e. house and settlement, than tenants are (e.g. in Arslan, 2009). With regard to the length of occupancy, while a study found that the dwellers with longer length of occupancy had less satisfaction with their houses than the dwellers with shorter length of occupancy (Behloul, 1991); some argued that the longer length of occupancy is in association with the construction of place attachment (Williams and Vaske, 2003). In this study, these two indicators aimed to explore whether the actual beneficiaries of the post-earthquake permanent housing projects had abandoned their houses by selling or renting to other people, which, in turn, was interpreted as they were not satisfied with the project.

¹⁹ Similar issues referred in Chapter 2 are on page 34 and 50.

The following indicators in this category are to reveal the earthquake-specific experiences of the participants in this study. To explain, by asking the damage level of their former houses and whether they had a loss of family member, it is aimed to understand how severely they had been affected by the related disaster. Normally, knowing that the target population of this study is identified as beneficiaries since their houses have either collapsed or heavily damaged, in addition to these two options, an option of ‘damaged’ referring to mildly damaged is also added. Here, the aim is to explore whether there were beneficiaries using their former houses by repairing them, given the findings of Tercan (2008). Finally, by asking about their stay in temporary shelters in the early aftermath of the earthquakes, it is aimed to find out whether the participant were accommodated in tent and container only, or temporarily migrated out the location affected, since this is the case significantly observed in Van after the 2011 earthquakes. Optionally, a final open-ended question allowed exploring to where the participant temporarily migrated if they did so. This part of the questionnaire is composed of 9 categorical and 2 continuous variables in total.

Physical indicators

Physical settings in post-disaster housing implementations can be evaluated in two sub-categories, which are houses at the individual scale and settlement at the community scale. With this in mind, the indicators defined in this category are grouped under four themes: residential unit, additional unit, alterations and settlement. In addressing the habitability of post-disaster housing, Da Silva (2006) suggests a chart of the prerequisites (Fig. 4.7). A number of previous studies also laid out the relation between the interior comfort, sufficient space, spatial arrangement and the satisfaction with the house, e.g. Behloul (1991), Gok (1995), Dikmen (2005), Barenstein (2006), Dagistanli (2007), Inal (2008), Onder et al. (2010), Ophiyaandri et al. (2012). In accordance with the studies and the prerequisites illustrated, the set of questions specified for the questionnaire included the evaluation of the size of house and rooms, the size of windows, the size of private lot, direction of entrance and terrace, level of privacy, the quality of interior finishing materials, easiness of cleaning and maintaining, and ultimately, the easiness of heating and ventilating in winter. This set of 8 questions is expected to have effects on the variables specified for the overall evaluation, and to operate them thorough they are put on 5-points Likert scale following a categorical variable indicating the spatial units of the participant’s house.

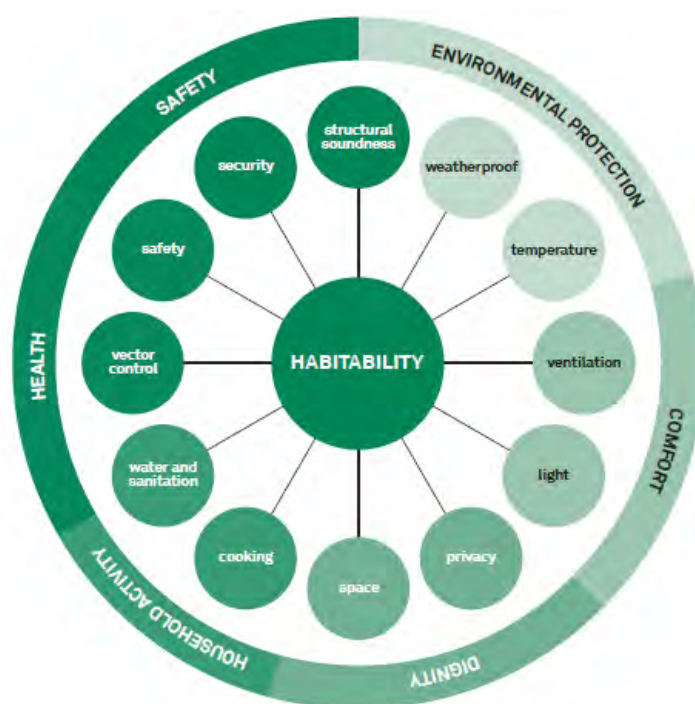


Figure 4.7 The physical prerequisites to address the habitability (Da Silva, 2006, p: 57).

In addition, as the studies of Dikmen (2005), Barenstein (2006), Dagistanli (2007) and Inal (2008) emphasised how the dwellers adapt the physical settings according to their needs by means of alterations and maintenance, the questionnaire also included a set of questions revealing whether the participant had done any changes to any part of the house, and if so to which space and what changes. This is critically important to evaluate since it explores the spatial needs of the people and their economic capacity to alter as well as their satisfaction with the quality of the interior finishing material as an underpinning to the alterations they had done.

Relocation of the settlements away from hazardous areas is generally preferred in the post-disaster reconstruction. Notwithstanding, as clarified in Chapter 2, rebuilding a new settlement requires more than implementing desirable houses. It should uphold with the infrastructure requirements and consider the socio-cultural settings of the community in the spatial organization (Da Silva, 2006; World Bank, 2006; IFRC, 2012). However, previous studies found that relocation hinders the dwellers' adaptation as they either turn out less satisfied with the implementations or resist to resettle in relocation area. Results in line with this issue are reported in previous studies with reference to settlement layout, e.g. Barenstein (2006) and Sanderson et al. (2011), distance from the livelihood, e.g. Tercan (2008), Mohapatra (2009), distance from the original location, e.g. Dikmen (2006), and lack of revitalisation of socio-spatial dynamics, e.g. Arslan (2009). Accordingly, the questions in this category are asked the

participants relocated to evaluate the location of their house within the settlement, the location of the new settlement compared to the former, distance to city centre, the layout of the settlement and the infrastructure with other public services. This set of 5 questions aims to find to what extent the participants are satisfied or dissatisfied with the relocation.

In rural life, the additional units such as barn, hayloft and storage are also important for the people as they are part of their possessions and activity patterns. This is not any different in rural eastern Turkey. Accordingly, the post-earthquake permanent housing implementations include a house as well as a barn if a beneficiary is entitled to both. However, like the houses, the barns built are also standardized. Previous studies found that they generally did not please people with large livestock that they needed either to build a new separate one or continued using their former barn if not damaged in the earthquake (e.g. in Gok, 1995; Tercan, 2008). The material used in the construction of the barns are also found inappropriate for the health of their livestock by some as the barns are built as RC frame with cement plaster walls (e.g. in Dikmen, 2010). Accordingly, with a categorical question, the participants are asked which additional units they had, and with one open-ended question they are asked which had been delivered along with their house as a part of their entitlement. With a second open-ended question, they are asked whether they built another barn or they used the former. This aims to uncover the cases which people had problems in the identification of their entitlement. If they use the barn to keep their livestock, they are asked to evaluate its size and location as well.

Social indicators

On one hand, a part of social vulnerability is underpinned by demographic characteristics such as age, education and level of income. On the other hand, have no experience and knowledge of earthquakes also affect the vulnerability since people neglect the significance of the preparedness, e.g. Tercan (2008), Mohapatra (2009), Taghizadeh et al. (2012) and Pajooch and Aziz (2012). Accordingly, it is suggested that the decision-makers to put some effort to increase the hazard awareness of the community affected to enable them to collaborate to increasing the disaster preparedness (Da Silva, 2006; Cutter et al., 2008). With this in mind, the participants of this study are asked whether they had participated in a training which informed them about the disaster they had experienced. This also indicates whether the decision-makers in Turkey carried out a systematic programme to reach the villagers and to address the earthquake awareness of the rural community. Besides, with four questions on 5-points Likert scale, the participants are asked about the extent of their knowledge of how to act in case of an

earthquake and to what extent they relied on their former house and to what extent they rely on the seismic-resistance of their post-earthquake houses. Ultimately, they are asked how strongly they are afraid of earthquakes after their experiences.

As a social indicator of the impacts of the earthquakes, migration should also be investigated in this study, due to the presence of the internal migration problem of Turkey, which caused to regional disparities in the long run as explained in the previous chapter. Several previous studies in Turkey (e.g Gok, 1995; Dagistanli, 2007; Tercan, 2008) revealed that migration is seen as a solution in the aftermath of an earthquake by the rural people living in villages. Few houses found abandoned in Van, which are implemented after the 1976 earthquake, during the first phase of the fieldwork strengthens this conclusion. Nevertheless, Tercan (2008) implied that the implementations of the post-earthquake houses had a preventive role in this regard. Accordingly, the participants are asked whether they or their family members had migrated temporarily because of the disruption the earthquake caused and also about the length of the temporary migration. They are also asked whether they had ever considered permanent migration and whether the resettlement in their post-earthquake houses changed their opinion.

As said in the definition of disaster by UNISDR, a serious disruption strikes the daily of the people affected, which challenge them to turn back to normality. As much as the physical settings, social settings also play a significant role in this process. In this regard, neighbourhood can be taken into account as a support of social network or social embeddedness (Cutter et al., 2008). By that means, it is suggested to keep the members of a community together even if they are relocated. This is because the members of community likely help each other in such a challenging process. Otherwise, for example, Mohapatra (2009) found how the members brought together from different fishing communities worried about their safety referring to the lack of trust due to not knowing each other. Behloul (1991) found that dwellers considered their neighbours as friends who help to solve common problems as well as to share communal spaces, and thus neighbours played a significant part in the satisfaction with the housing development. With this in mind, the part of the social evaluation of the questionnaire also included a set of questions regarding the significance of neighbours by asking whether the participants know all of their neighbours and whether they are relocated from the same village. Besides, with four questions on a 5-points Likert scale, the pattern of the relationship with neighbours is also sought.

To explore the impacts of the disruption the disaster caused, the participants are asked about the changes in their daily life. Disruption in daily life in post-disaster conditions can be quite complicated since it has psychological links causing depression and post-traumatic stress, which affect the adaptation of the people affected to the post-disaster living circumstances (Guo et al., 2011; NCTSN, n. d.). For example, the study of Mohapatra (2009) concluded that most of the disaster-survivors struggle re-establishing their normal life. Accordingly, the participants are asked about the length of the disruption they experienced and their feeling of coming back to normalcy. Considering the rural life, with another categorical question they are asked whether their residential unit and barn are located in the same settlement, and with another open-ended question they are asked about the changes in their habits as a result of the changes in their physical settings. By experiencing such diverse psychological, social and physical environment in the post-implementation stage, the dwellers begin to compare their old and new environments; thus, they may begin to feel longing to the former life and settings, and as a consequence, may decide to leave their new settings, which is deemed maladaptation, as also discussed in the literature review. The latter explained is deemed more critical for the relocated communities as the studies of Dikmen (2005), Darkwa (2006), Tercan (2008) and Arslan (2009) highlighted this issue.

Economic indicators

The post-disaster housing projects implemented in rural areas are generally funded by the states through the house loans allocated to beneficiaries as seen in the examples studied in Chapter 2. The house loans are generally modelled with a long-term repayment scheme considering the limited rural livelihood. However, previous studies revealed that most of the rural dwellers struggles repaying their loans as they hardly recover their livelihood (Barenstein, 2006; Tercan, 2008; Mohapatra, 2009; Dikmen, 2010; Dalen et al., 2012). Accordingly, the economic indicators selected to evaluate in this study are grouped into loans, livelihood and expenses.

First of all, the participants are asked whether they received any further financial assistance from the state other than the house loan, and then they are asked how much of the loan they had repaid. This question exempts the participants from Van since their loan scheme is in the moratorium, which postpones their installments for two years (and will start in late 2015). To say, this question targets the remaining participants of the study since at the time of the fieldwork, the participants from Erzurum are normally supposed to be repaid nearly half of

their loans and the participants from Erzincan are supposed to be repaid their loans in total. Having said, considering the findings from the previous studies, a set of questions is put on 5-points Likert scale to understand the viewpoint of the rural dwellers with regard to the amount of the house loans, the repayment model, the instalment scheme and its length, other optional repayment models and the affordability of the loan. More critically, they are also asked about the transparency and clarity in the paperwork and documentation regarding the loan allocations and the worthiness of the house they are delivered to the total amount of the loan. It is expected to find a relation between the worthiness of the house and the satisfaction with the structural quality of the house and the interior finishing materials used.

Furthermore, the perspective to the loans is expected to be in relation with the participants' source of income, i.e. livelihood. Accordingly, the participants are asked to specify their source of income between the given options. Considering the characteristic livelihood of the region, the participants are also asked whether they lost their livestock and whether they applied for the financial assistance from the state to recover it. Besides, in case they have a different source of income, they are asked whether they had become unemployed, and ultimately they are asked to compare their pre-earthquake and post-earthquake economic status in order to explore to what extent they were able to recover after the disaster.

Dalen et al. (2012) stated that the house loans for the reconstruction burden the recovery process of rural people since they are generally dependent on a limited source of income. With this in mind, a categorical question is asked to the participants in order to find the share of the instalments in their monthly expenses. The question asks the participant to put in order the expenses of installment, kitchen, heating and others (e.g. children's schooling). To take further the question of heating, the participants are asked to specify the type of heating they use. This questioned whether the participants had to change their type of heating because of the type of the houses they are delivered. To say, traditionally in the rural life, people in the region use turd or wood as they are available with no extra cost. Hence, it is important to understand whether the houses implemented cause further expenditure burdening the economic status of the people. In line with that, a set of four questions on 5-points Likert scale are, finally, asked to explore the viewpoints of the participants with regard to the their expenses and income level.

Overall decision indicators

This part of the questionnaire is designed to link the deliberately chosen indicators to the overall evaluation of the houses. Briefly, as a result of all these physical, social, economic and

demographic indicators, dwellers make some overall decisions about their houses and the reconstruction approach. The participants are firstly asked how much they are satisfied with their post-earthquake permanent houses built by the state. Although this appears as a question that can be answered directly, it is inherently linked to their expectations from the housing as well. Hence, they are also asked how much of their expectations had been met taken into account their actual occupancy experience in their houses. This will indicate how much of their expectations differed from their experience and how much of them overlapped. In between these two questions, the participants are asked to compare their former damaged/collapsed houses with the post-earthquake permanent houses in terms of the improvement in their living conditions and the preference of the structural system and materials replacing the traditional construction practice of the region. In relation with the latter, for example, Leersum and Arora (2011) found that most of the rural dwellers living in the houses built after the 2005 Pakistan earthquake were satisfied with the non-local construction practice. In addition to their studies, Dikmen (2005) and Barenstein (2006) also pointed the difference between the dwellers' satisfaction with the houses built through owner-driven approach and contractor-driven approach. In this study, since all of the participants' houses are built through the contractors hired, it is not aimed to do such comparison within the questionnaire. Notwithstanding, through semi-structured interviews, the participants' opinion regarding the reconstruction approach are sought in detail, which is explained later in this chapter. Another key indicator of the overall evaluation is selected to explore the participants' tendency abandoning their houses by asking them how much they wish to live in their houses for the rest of their lives. This indicator is expected to have links with the condition of relocation as well as with the five overall satisfaction indicators identified above.

In further exploration of the reconstruction process, the participants are also asked about their experiences of contacting the authorities and their trust in terms of the transparency in the bureaucracy and the accountability of the state in the completion of the housing projects. For example, Ophiyandri et al. (2012) identified these two indicators as critical success factors in achieving high satisfaction levels in the post-disaster housing reconstruction projects. As highlighted in Chapter 2, the ideal reconstruction approach allows efficient participation of the beneficiaries in the process of planning the physical environment (Da Silva, 2006). Previous studies revealed the relation between the level of participation and the satisfaction (e.g. Dikmen, 2005; Barenstein, 2006; Arslan, 2009; Onder et al., 2010; Leersum and Arora, 2011; Ophiyandri et al., 2012). Accordingly, the participants are asked whether they had taken a part

in the decision-making process (e.g. choosing relocation site or designing the house layout). Ultimately, they are also asked whether they had any particular complaint regarding the housing reconstruction process. However, for example, Mohapatra (2009) reported that the people mostly avoided responding such direct questions regarding the state or the government by mentioning the fear they likely had due to the binding contracts and loans. With this in mind, the semi-structured interviewing is taken as an opportunity to develop this question in further.

4.3.3.3 Formation of the questionnaire and the semi-structured interview

In line with the indicator categories explained thus far, the questionnaire is structured with five parts: general information and overall evaluation on the first page, physical evaluation on the second page, social evaluation on the third page and economic evaluation on the fourth page. In total, the questionnaire consists of 80 questions. The questions were firstly worded in English and then translated in Turkish. Before the final form of the questionnaire, the content was checked by an architect, who participated in damage assessment surveying in Van and was also an instructor in the Caritas programme. The overall structures and wording of the questions were checked with a doctoral candidate in statistics and psychology. In terms of designing the measurement, 47 questions are put on 5-points Likert scale, in which 1 represents ‘strongly disagree/strongly dissatisfied’ and 5 represents ‘strongly agreed/strongly satisfied’. The remaining questions are designed as either categorical or continuous data. The full layout of the questionnaire is provided in Appendix I.

As explained earlier in this chapter, the study utilises semi-structured interviewing to bring further explorations to the statistical data to be drawn from the questionnaires. Accordingly, the interview questions are also selected based on the indicator categories defined for the questionnaire. To say, the interview consists of 10 open-ended questions grouped into four categories. In the overall evaluation, the participants are asked to elaborate their opinions regarding the reconstruction approach including the involvement of contractors, the length of the construction and delivery of the houses, and the replacement of the traditional building style. In the physical evaluation, they are asked to elaborate the reasons for their dissatisfaction with the house, if they were, and their adaptation to the house and settlement, if they were relocated, and their preference of construction method and living style. In the social evaluation, they are asked to elaborate their thoughts on migration, and to summarise their daily routine and specify the changes occurred after the disaster. Ultimately, in the economic evaluation,

they are asked to elaborate the impacts of the earthquake on their income, and their thoughts regarding their livelihood and whether they would prefer a different type of occupation with a standard and stable income. The full layout of the questions is provided in Appendix II.

4.4 Conduct of the research

Community-based participatory research requires researcher deliberately to consider further details linked to the decisions about how to conduct the research in the field and to take into account the constraints likely to influence the quality and achievements of the research (Hall, 2008; Blaikie, 2010). The following four key steps clarify what constraints and considerations were taken into account in this study.

4.4.1 Sampling and sample size

The method used for sampling is vitally important for the research. It deals with the representativeness, which should be appropriate to the aim and the context of research. If a sample is not determined appropriately, then the research is open to be criticised as biased and lack of generalizability (Bazeley, 2004; Yount, 2006). Talking specifically for this study, the target population is the people living in the post-earthquake permanent houses built by the state in the villages of the Eastern Anatolia Region of Turkey. The region is the largest in Turkey and has 16 provinces; hence the sampling was made in combination of two methods and at two stages. Firstly, cluster sampling was adopted and each cluster is treated as a case study. When establishing the replication logic for the multiple-case study design, cluster sampling was inherently applied since three provinces were selected based on their significances on a 20-year time frame set for the study.

Cluster sampling is the method preferred when the target population is spread across a large geographical area that is expensive and time consuming to study. Accordingly, it usually refers to geographical clustering and selects groups of people living in particular areas that meet the criteria of a research. The most important issue in cluster sampling is to select areas homogeneously if the aim is to find similarities, or vice versa. It is more critical when the characteristics across a geographical area vary considerably. Cluster sampling can also be used in combination with other sampling methods (Cluster sampling, n.d.; Stratified Sampling vs. Cluster Sampling, 2014). For example, following the geographical clustering, one can set a fixed quota to collect data from each cluster, which is the method called quota sampling and it is a satisfying sampling strategy if the population is defined within a certain scope (Non-

probability sampling, 2013). It has two types; proportional and non-proportional quota sampling. In proportionate quota sampling, different types of criteria such as gender, age and education are included to proportionate the samples within the quota. In this study, cluster sampling is followed by non-proportional quota sampling since there were no criteria else than being a resident in a state-built post-earthquake permanent house in one of the clustered areas. Indeed, rather than grouping the samples before reaching the fixed quota, the samples were grouped after the fixed quota was reached (e.g. relocated and not-relocated settlement). This is to say that the proportion of different sub-groups, e.g. the age ranges of 19-35 and 36-49, were not the constraints at selecting the participants, but such sub-groups were used to interpret the results of the data analyses and to see their effects on other indicators.

Based on the experience and leaning from the field, 80 was the quota for collecting filled questionnaires from each case study area. This was decided to portray the population sufficiently and each case study equally. Further, this was a deliberate decision regarding the experience in the first and second phase of the fieldwork, which informed the researcher about how to balance the quota and the time in the field considering the financial constraints as well. Eventually, the quota was accomplished by collecting 240 questionnaires in total within the planned schedule with no serious challenge, which showed the importance of gaining preliminary experience in the field.

Sample size is also associated with the saturation, which is the principle generally applied to qualitative studies. It is the level of data which after it becomes repetitive and redundant (Hennink et al., 2011). The concept of saturation aims to ensure that the study covers the issues regarding the subject studied at a sufficient level; therefore, it should be assessed in the nature of the study (Mason, 2010). Generally, the range of acceptable sample size varies between 30 and 50 for qualitative studies. Mason (2010) assessed 560 doctoral studies completed studies in the UK and Ireland universities and found that the mean of their sample sizes was 31. In terms of semi-structured interviews in this study, the quota was 36 at the beginning and desirably it was 12 for each case study. However, the process in the field was different than this approach. The interview was audio-recorded and included particular questions regarding post-earthquake experience, reconstruction and migration. Hence, as their experiences were quite fresh at the time of the fieldwork conducted, the participants in Van were more interested in being interviewed; whereas, the participants in Erzincan were far less interested given the long period of time passed that diminished the influences of the earthquake occurred two decades ago. The participants in Erzurum rather varied as some were easy to go on

interviewing, while some were uneasy with being audio-recorded. All of these variations affected the quota, and it resulted with 35 interviews out of 240 participants, respectively 21, 13 and 1 from Van, Erzurum and Erzincan. Nevertheless, the interviews in Van and Erzurum were fruitful as they captured a variety of issues in-depth.

4.4.2 Recruitment of participants

As the villages visited were reconstructed by the state after earthquakes, mostly all of the dwellers were suitable to include as sample in the study. Accordingly, the general approach to recruit the participants was just to knock their doors and kindly ask whether they would like to contribute the research. This was the process until the required number of questionnaire was filled for each case study area. However, there were rejections to participate as many as the number of the participants did not hesitate to take part in the study. This is to say that conducting the fieldwork engaged local community was not an easy task to achieve. Meanwhile, this was not unexpected; indeed, the participants from vulnerable communities often feel insecure, are lack of self-confidence and preoccupied with their poor conditions, and thus, they generally hesitate to involve in any kinds of research seeking information from them (Oliver, 2003).

Moreover, even if the issue of gender is not one of the measures of a research, it inevitably makes difference in how participants express themselves (Oliver 2003). Gender issues may affect the accessibility of data as well. For example, a female researcher has the advantage of approaching women participants more easily than a male researcher can (Kapila and Lyon 2006). Social structures and gender relations are more restrictive in small communities. In this context, rural settlements like villages are the places where gender issues may start to challenge researchers. This applies particularly non-western populations, in which women are found difficult to interview due to their shyness and unwillingness to talk about their private lives, and also they are usually expected to follow decisions made by the male members of their families (Kapila and Lyon 2006; Bock and Shortall 2006). This challenge was encountered during the fieldwork since the participants were largely women – housewives and eldest daughter- and the rate of illiteracy and low level of education were considerably high. Therefore, understandably, they were afraid of signing a paper passed from an outsider –researcher- whom they had seen for the first time. Furthermore, the women participants highly hesitated at signing a paper without the permission of their husbands as the fieldwork was carried out in daytime, men were mostly away for work. As a result of a deliberate decision, written consent

was also waved to oral consent to conduct the interviews. Apart from this, all of the participants were given a copy of the information sheet of the study. It must also be noted that the participation was voluntary based and none of the individuals took part in the study have been paid, which would be ethically inappropriate.

4.4.3 Ethical considerations

Ethical practice becomes highly crucial when the research requires contacting vulnerable community members in their settings. Talking in the context of this study, conducting fieldwork research with earthquake survivors, who lost their homes, requires a very sensitive approach in terms of considering further ethical principles to prevent any harmful consequences (Connolly, 2003; Hilhorst and Jansen, 2005; Hugman et al., 2011; World Bank, 2011).

Primarily, when establishing the communication with participants from such communities, respecting for their dignity and privacy is defined as the key principle to conduct research responsibly (Connolly, 2003; Hilhorst and Jansen, 2005). This principle is about respecting the physical conditions they live, daily routine they follow and understanding the social and moral values they have within their community (Hilhorst and Jansen, 2005; World Bank, 2011). Gaining informed consent of participants is another principle of ethical practice that is often challenging for researchers to get in written form. In vulnerable groups, the participants generally afraid of signing written consent forms as they think printing name and signature on a paper would make them traceable and put them in risk of harm in future (Wiles, 2013). To get the consent of participants, researcher must be honest and transparent when informing participants about the aim, motivations and content of the research, why and how the individuals have been selected, how the information they provide will be used and what the participants should expect or not expect from the study by participating. In particular to post-disaster studies, participants should be clearly stated that their participation will not bring along more relief and recovery aid (Ozerdem & Bowd 2010; World Bank 2011).

Ensuring confidentiality and anonymous use of data are the next fundamental principles of ethical practice after collecting data, and the essential concern of the researchers engage vulnerable communities (Ozerdem & Bowd 2010; Hugman et al., 2011). However, in majority of participatory research, respondents are selected purposefully and in limited numbers because of possessing experiences and characteristics the subject studied requires (Hennink et al. 2011). To say, the smaller number of participants means the higher risk of

identification of the participants (Israel & Hay 2006). Accordingly, it is suggested to store data in an anonymous form by removing all identifying information as much as possible (Connolly, 2003; Clark, 2006; Hennink et al. 2011). The form of recording data in the field comes with the concern of anonymity. That is, collecting data in visual forms, i.e. photographs and videos, provokes significant challenges in protecting the absolute anonymity of participants; whereas, there is the availability of using pseudonyms in transcripts of audio records, which prevents the identification of individuals (Whyte 1982; Wiles 2013). There is also the argument that using recording devices during fieldwork may look formal to interviewees (Whyte 1982), which may cause them to hide much of their thoughts, and rather superficially express themselves, which is an important obstacle to reach the in-depth information. Hence, researchers should put sufficient time and effort when approaching to each of their participants; explain their purpose clearly at using the recording device (Connolly 2003).

Here, the aim at highlighting the fundamental ethical principles is to clarify that the researcher was aware of the required standards of ethics and made every effort to meet the standards throughout the research progress. With regard to the target population of this study, none of the participants' name, phone number, address or other kinds of identical information was collected. The questionnaires and interviews were conducted anonymously as they were enumerated by the researcher. To gain informed consent, as explained earlier, the participants were asked for their oral consent prior to begin the survey, and all of the participants were handed in an information sheet explaining the baseline of the research²⁰. Waiving written consent was also to avoid raising the participants' expectations to receive official help or assistance in turn of their participation considering that the sampled villages were reconstructed by the state after the earthquakes. The ethical approval of this research was gained from the Research Ethics Committee of the School of Planning, Architecture and Civil Engineering of QUB, which adopts the 1998 Data Protection Act. The approval was issued in May 2013 and the fieldwork was begun in late August 2013. The committee requested the researcher to fill a risk assessment form regarding the conditions of the field to be visited to collect the data and to verify the form of recording the data. The approval is provided in Appendix III.

4.4.4 Methods of data analyses

While conducting fieldwork for case study research, data analysis inevitably begins to run in the background since researcher makes direct contact with participants, observes their natural

²⁰ The information sheet can be seen in Appendix III.

settings, and starts to make first interpretations from the data in her mind (Kohn, 1997; Pauly, 2010). This is a valuable preliminary analytical process which provides guidance to gain data that the researcher begins exploring the relationships, differences and similarities between the cases (Yin, 2009; Creswell, 2009; Pauly, 2010; Harder, 2010). Multiple-case study method itself guided the process of data analysis as it entails analysing each case study separately first, and making comparison between the case studies afterwards. Besides, when conducting the fieldwork in Van, Erzurum and Erzincan, a number of themes were identified in addressing the research objectives. Therefore, establishing a structured approach to data analyses was more about deciding how to process and present the data in reflecting the mixed-methods research design of the study. Deliberately it was decided to analyse and present the qualitative and quantitative data separately and accordingly a selection of data analysis methods was made based on the previous community-based disaster studies mentioned earlier in this chapter.

Qualitative data analyses

The qualitative data collection of this study can be grouped into two categories: the first-hand data that the researcher herself collected, and the secondary data that are obtained from other resources. The first category is the collection of the semi-structured interviews conducted with 35 participants, the researcher's direct observation notes, and the photographs taken from the villages and houses. The second category consists of satellite maps of the settlements captured via Google Earth and literature sources. When analysing such diverse data, researcher becomes the key instrument to produce explanations from the meanings through inductive analyses that start by categorising data, then build patterns and ends with the interpretations of data by reflecting (*Reflexivity*) the background of participants and the researcher's personal observations (Payne and Payne, 2004; Creswell, 2009; Willig, 2013). To say, analysing qualitative data requires a developed understanding of the phenomenon under study to be able to link the actions and meanings as accurately as possible (Moore, 2000).

Accordingly, the literature sources are used to introduce the characteristics of the provinces studied as well as to explore their particular earthquake experiences and to illustrate the earlier examples of post-earthquake housing projects in Turkey. The photographs taken by the researcher and the satellite maps captured along with the abstract maps created are used to illustrate the sample settlements. Preliminary notes the researcher took during the fieldworks and surveys enhanced the understanding the rural perspective and informed the interpretation of the interview data. A descriptive documentation was done in Chapter 5 when highlighting

the transformation of the rural built environment through post-earthquake housing reconstruction strategy of the state. The semi-structured interviews are translated from Turkish to English and analysed under the themes defined. In Chapter 6, referring to quotations following the statistical analyses help to recap the findings, and also decreased the exhaustiveness of the statistical results by bringing short illustrations from the real-life stories at individual scale.

Quantitative data analyses

Quantitative analyses aim “to capture the amount of variation” in a given sample (Hardy and Bryman, 2009, p: 6), which is called data reduction. Using statistical models is the method for data reduction, and which to choose and how to conduct are prescribed based on the kinds of data (i.e. categorical, ordinal or interval) and the purpose of analysis (descriptive or inferential). The results of quantitative analyses are interpreted based on the assumptions inherent in the statistical models employed. In this study, all of the statistical outputs were reported and interpreted according to the significance level of .05 for the 95% level of confidence, below is accepted statistically significant²¹.

The quantitative dataset of this study, the structured questionnaires applied face-to-face with 240 participants, are firstly analysed through descriptive statistics, which are the simplest statistical models called univariate analyses and suggested to apply when the aim is to describe the population examined. In this study, they are used to lay the demographic characteristics of the participants (e.g. the distributions of age groups) and the overall evaluation result of their satisfaction levels (e.g. the satisfaction with current living standards). The level of data reduction is then elaborated to inferential statistics with the aim of exploring the variables related to each other, the probability degree of their relation and the strength of their relation²². Exploring the differences between the groups identified in the context of the research was an essential aspect of this study. Thus, independent-samples T-test is employed when two groups are compared (e.g. relocated and not-relocated), and one-way ANOVA between-groups was employed when the differences between three and more groups are examined (e.g. age groups). ANOVA was also operated when comparing three case studies by labelling each as a separate group. Cross-tabulation -contingency table- is utilised to display the distributions of occurrences between two variables, and also to monitor whether the data distribution cause

²¹ This is the case that the null hypothesis is rejected in the analysis (Gaten, 2000).

²² Only bivariate analyses are employed in this study. The inferences made at this level are easy to bring into the real-life context in terms of linking with the interview data of the study. Multivariate analysis, on the other hand, seeks causal interrelationships between more than three correlated variables at one time, and is claimed the furthest level of data reduction (Moore, 2000; Bryman, 2012; Tabachnick and Fidell, 2013).

distortion in the results of other bivariate analyses conducted. For example, when a T-test and ANOVA resulted with unexpected significant differences between the groups, cross-tabulations were laid to check whether the difference was true or was a result of distortion (i.e. caused by the number of unusable data). This cross-check approach prevented misinterpretation of the results. Correlation is operated in the study to explore how strongly the variables are related. It is mainly used to correlate the participants' overall satisfaction with their houses and with their physical features. Pearson's r correlation coefficient, a parametric test, is utilised in the first place. In few cases, Spearman's rho correlation, a non-parametric test, is also conducted to check whether the correlation is monotonic or linear.

As a special note regarding the Likert-scale items in the questionnaire of this study, the literature found emphasise that Likert-scale with at least five-points of measure can be subjected to both non-parametric and parametric tests since each point in the scale contextually defines equal distance from each other. This makes it interval scale to a reasonable extent since participants are enabled to express themselves on different levels of satisfaction (or dissatisfaction) and agreement (or disagreement) rather than limited categorical options (yes/no/maybe). However, they also stress that what is measured through Likert scale and the reliability of the scale (i.e. internal consistency) are more critical at interpreting results and drawing conclusion about population studied (Blankenship, 2010; Allen and Seaman, 2007; Carifio and Perla, 2007; Brown, 2011; Jackson, 2012; Lantz, 2013; Yusoff and Janor, 2014). The reliability of the questionnaire used in the study is discussed in the following section.

4.5 Trustworthiness of the research

The four elements determining the trustworthiness of a research are truth value, applicability, consistency and neutrality (Guba, 1981; Guba and Lincoln, 1985). Addressing these criteria helps researchers to increase the rigor of their study and assists the reader to judge the value and quality of the analyses and results, so they can rely on the conclusion of study (Krefting, 1991). Each given criterion is discussed how this study addressed these concerns in the context of qualitative and quantitative methodologies.

4.5.1 Truth value

In quantitative studies, truth value is the question of internal validity which is to ensure the appropriateness of instrument to obtain accurate data as what and how is intended to measure in a study (Krefting, 1991; Shenton, 2004). In qualitative studies, credibility is the equivalent of

truth value and it is highly critical for the research since it is dependent upon the accuracy of the data provided by the subject as much as how researcher presents the data (Krefting, 1991; Shenton, 2004). In this regard, for example, prior to begin collecting data an early engagement with the site and target community is suggested to develop familiarity with the area and culture particularly for the type of research that involves fieldwork and participatory approaches (Guba, 1981; Shenton, 2004). By doing so, a researcher takes the opportunity to develop perceptions and to better understand the target population's perceptions and stances (Guba, 1981). This engagement also assists researcher to better discover and identify underlying factors of the object studied, which eventually enrich the findings (Krefting, 1991).

In this study, the researcher conducted fieldwork in three phases as explained under the title of fieldwork approach. The first and the second phases had the overlapping purpose with the suggestion of early engagement with site and community, which is also aligned with the approach taken in disaster studies. It was aimed to understand the structural and non-structural impacts of earthquakes and the dynamics within local community affected. When the province of Van was visited following the 2011 earthquakes and engaged with damage assessment surveys with a group, the researcher made the first contact with the local community in the study region, as she has never been before. In the second field visit, randomly selected remote villages were visited in the provinces of Erzurum, Kars and Ardahan, which are located in the north of the study region. Both field visits provided invaluable insights to the context and the research design of the study. Particularly, the choice of measurement tools (questionnaire and semi-structured interview) was made based on the field experience gained, and their design was shaped in correspondence with the contextual development of the research following these early field visits. Gaining such experience and learning from the field and the community guided to a more fruitful final fieldwork that brought the accurate data as far as possible. Shenton (2004) suggest employing well-established methods widely preferred in particular phenomenon to ensure the truth value of a study. This was primarily achieved though the review of the methodological choices of a number of disaster studies conducted at doctoral research level.

4.5.2 Applicability

Applicability is the generalisability of findings of a study conducted in a specific setting to different settings, or that of a study conducted with a small number of participants to a larger population. Transferability addresses the applicability in qualitative studies. However, it is

widely questioned, and even found impossible, how the findings of qualitative studies can be transferred to a wider population since they often focus on a specific phenomenon and particular experiences of a small number of individuals selected precisely by researchers (Krefting, 1991; Shenton, 2004). This is an issue less challenging in quantitative studies, for which external validity assures the generalisability of findings (Shenton, 2004). A tactic suggested for researchers is to compare the characteristics of participants with that of target population of the research which supports the representativeness of the sample (Krefting, 1991); thus, convinces the reader that the findings can be transferred to the target population. Another tactic is to enclose sufficient background about the research setting and population of the study in ensuring the data collected from the site and participants reflect them at the most possible way (Guba and Lincoln, 1985; Krefting, 1991). Collecting the findings of previous studies which adopted similar methods and conducted in different settings within similar context also demonstrates the applicability of a research to different environments (Shenton, 2004). In a research adopting case study method, as done in this study, applicability can be addressed through replication theory, the logic underlying multiple-case study method. By doing so, researcher can validate that their findings are generalisable to their target population as they already provide multiple source of evidence within their study (Yin, 2003).

This is why a multiple-case study is preferred rather than a single case study. Given the size of the study region, two largest provinces, Erzurum and Van, were selected along with a third smaller province, Erzincan, to increase the geographical representativeness of the region. These three provinces were also selected based on their socio-economic and demographic development, which reflect the diversity in the region. Thus, it was aimed to depict a comprehensive picture from the region, which can assist the applicability of the findings to other post-earthquake permanent housing implementations and local communities in eastern Turkey. Moreover, review of the findings as well as the review of the research methods of previous studies in Chapter 2 and Chapter 5 with the context of post-disaster housing reconstruction illustrated what should be expected from this kind of research focus, and how the results should be interpreted in accordance with the local context. To provide sufficient background to the research setting and population, each case study is also extensively researched from the characteristics of rural population to the quality of the built environment. In doing so, it is also achieved to present a comparison between the samples and the population based on their demographic characteristics, which validates the representativeness of the samples so that to derive generalisable findings for the study region.

4.5.3 Consistency

In quantitative studies when the instrument (i.e. questionnaire) includes Likert-scale items to measure individuals' normally unquantifiable opinions and emotions, consistency within the scale items is estimated using statistical models entitled 'test of reliability'. There are one-step and two-step statistical models to estimate reliability and the Cronbach's alpha is the most widely preferred one-step statistical model (Gebotys, 2003; Gliem and Gliem, 2003; Pallant, 2005; Trochim, 2006). The Cronbach's alpha, introduced by Lee J. Cronbach (1951), calculates the average correlations between the responds of two items (inter-item) and that between single item and all items (item-total) (Trochim, 2006). The coefficient of reliability results between 0 and 1. The values close to 1.0 indicate greater reliability, and the values below 0.7 are not desirable to proceed with the data. The suggested value is between 0.7 and 0.8 (Gliem and Gliem, 2003; Pallant, 2005; Field, 2006), while some state it should be above 0.8 (Carmines and Zeller, 1979). For example, Kellens et al. (2011), Taghizadeh et al. (2012), Hosseini et al. (2013), Guo et al. (2013), Pajooch and Aziz (2014) and Oral et al. (2015) noted reliability coefficient values varied between 0.70 and 0.86 in their studies focused on various aspects of disasters such as the level of flood hazard preparedness, people's perception of coastal flood risk, perception of earthquake and precautionary measures and post-disaster trauma. These examples approve the suggestion regarding the preferred coefficient value.

Accordingly, the reliability test was applied to the 5-points Likert-scale items in the questionnaire used in this study before proceeding to statistical analyses. Firstly, the test was applied to the part of overall evaluation²³. The coefficient was 0.90. Afterwards, all of the items (in total 47) put in the Likert-scale were tested and the reliability coefficient was 0.85. Consequently, it can be stated that the results based on the statistical outputs presented in this thesis are reliable as the relations between the items across the questionnaire are consistent.

Rather less known, dependability indicates consistency in qualitative studies. Shenton (2004) suggests researchers to make notes as audits to describe the progress in details when the data is being collected in the field; the changes in the agenda planned and how it was undertaken in the field should be noted in a reflective way. Correspondingly, notes regarding the fieldwork stages are made under the related section of this chapter, which highlight few challenges encountered during the village visits, e.g. waiving the consent form to conduct interviews since the people thought it was an official record that might affect them in future. Some notes are

²³ See Appendix VI.

also made in Chapter 6 when giving a brief introduction to the interview data in each case study. They include the personal opinions of researcher about the conservativeness of the rural community and how it affected the progress in collecting the interview data. Further notes are also made when laying the results occurred in a different way than expected (e.g., why the participants are happy with their houses despite the replacement of their traditional environment).

4.5.4 Neutrality

In qualitative research, neutrality is claimed not possible given the fact that the contact between researcher and participants inevitably affect the way researcher evaluate their observations (Diebel, 2008). Neutrality is defined achievable only when the credibility and transferability of the data is established within a qualitative research (Krefting, 1991; Payne and Payne, 2004). It is about how much the data is reflected without researcher's bias and how much the data is confirmable in case of another investigator conduct the research by employing different methods and whether would result with similar findings (Guba, 1981; Krefting, 1991). Accordingly, neutrality can be addressed through confirmability in qualitative research, either by self-critical methodological audit reporting the steps taken throughout the research or by triangulation within the research (Guba, 1981; Krefting, 1991; Seale, 1999; Shenton, 2004). As seen, triangulation is deemed as a solution that can neutralise the methodological weaknesses and unavoidable biases (Jick, 1979). In quantitative research, neutrality is the aspect of objectivity and is claimed the core of quantitative research since it entails methods discovering knowledge independent from the researcher's perspective (Dempster, 1998; Payne and Payne, 2004). Objectivity is defined achievable if "the proper distance between researcher and subjects" (Krefting, 1991, p. 217) is kept, and at the level of analysis if structured methods (e.g. structured questionnaire) are used to prevent the manipulation of data and potential positioning of results by researcher (Dempster, 1998). The replication logic in the heart of multiple-case study method is claimed one of the ways of increasing objectivity since it provides multiple evidences from similar or contrast cases (Riege, 2003).

Assessing how the neutrality was maintained in this study, it can be said that the mixed-methods research design of the study helped itself to keep the track of neutrality as utilised combined methods of data collection. If the quantitative data analyses were the only source of evidence to understand the focus of this study, then the big picture would have been captured with more of positive findings in terms of the overall evaluation results regarding the post-

earthquake permanent housing implementations and the beneficiaries' overall satisfaction. In this case the research would not be neutral as much as it was expected, since the interviews laid rather negative findings. This can be explained by the data reduction of the quantitative research part which accumulated a large volume of dataset, whereas the qualitative research part was quite inclusive and in-depth which actually laid numerous challenges even within a smaller dataset. Hence, it can be concluded that using a combination of research approaches and tools not only better captured the picture of the study region and population, but also prevent the research positioning either by the side of the state or the dwellers, which in turn resulted from a neutral perspective in a way of putting the facts objectively together from the field.

4.6 Summary

The methodological development and the progression of the research are explained and discussed throughout the chapter. Knowing the theoretical strengths of qualitative and quantitative research and the suggested practical approach in disaster studies, this study is undertaken through mixed-methods research with an embedded design employing multiple-case studies. Accordingly, an array of types of data is collected concurrently during the fieldwork. Additionally, field notes, visuals and secondary data are used to enhance the understanding and better illustrate the research findings. Making use of both quantitative and qualitative research methods has conformed the criteria regarding the trustworthiness of the research. Have the overall methodological design process explained in this chapter; the next chapter elaborates the contextual and structural development of the questionnaire as the primary tool for inquiry.

Chapter 5

Post-earthquake permanent housing reconstruction strategy in rural eastern Turkey and case studies from the past 20 years

This chapter focuses on the transformation of rural settlements, which occurs rapidly as the product of the transformative approach of the state to the post-earthquake housing reconstruction. Accordingly, it begins with a brief highlight on the role of the state in the reconstruction process, and continues with a review of the previous studies outlining some of the implementations completed in the past. With this background, the case studies of this thesis are investigated thorough the earthquake experiences and the strategy adopted in the reconstruction.

5.1 The post-earthquake reconstruction strategy of the state

Remembering the examples of housing implementations reviewed in Chapter 2, from China, Sichuan, from Italy, L'Aquila, from India, Gujarat, and from Japan, Tohoku, the governmental perspective generally manage the reconstruction process by setting policies and establishing national disaster agencies and committees immediately after disasters. Similarly, in Turkey, the reconstruction process in the aftermath of an earthquake is under governmental authority through the corresponding ministry²⁴ that sets and enacts laws and regulations regarding construction and settlements (Dikmen, 2010). In details, the law numbered 7269²⁵ is the first and the fundamental to serve aid, rehabilitation and recovery to the disaster-affect people when the AFAD is in control. The law numbered 6306, the *Law on Transformation of Places under Disaster Risk*, was enacted on 16th May 2012 and since then it primarily focused on the implementations for the disaster-prone areas, and mainly adopted by the TOKI. Generally, beginning with the 1939 earthquake in Erzincan²⁶, each devastating earthquake in the country

²⁴ See the introductory page 'Attributions'. Briefly, this thesis covers the period of 1992 and 2012. Accordingly, the referred ministry bodies are the Ministry of Public Works and Housing (existed between 1983 and 2011) and the Ministry of Environment and Urban Planning (exists since 2011).

²⁵ *Umumi hayata muessir afetler dolayisiyla alinacak tedbirlerle yapilacak yardimlara dair kanun* (the law was enacted in 15th May 1959).

²⁶ See Appendix V.

has been taken as an occasion to bring changes into the post-disaster action scheme of the state, which basically aims to rebuild the destroyed built environment and the loss of livestock and crops in affected lands with reference to the law enacted since 1959. It should be noted that since then the state has put a lot of effort to reform the structure of disaster management and to design more strict building and construction codes aiming to reduce the impact of earthquakes both in the state level (in financial context) as well as the society level (life and property losses). In this regard, particularly the reforms made after the 1999 Marmara earthquakes have been recognised as from a long-term perspective, that is, have attempted to link the country's developmental plans to the earthquake response, recovery and mitigation plans (Ganapati, 2014).

For example, with the crisis born following the milestone disaster in 1999 due to the lack of financial coverage both in private and state sector for the widespread property (primarily residence) and infrastructure loss, the state decided to form an official and compulsory disaster insurance scheme. To this aim, the Turkish Catastrophe Insurance Pool²⁷ was modelled in particular to the earthquake and earthquake-triggered disasters and mandated to each house-owner and house-buyer²⁸. However, this scheme also primarily focused on urban dwellings and settlements, as it is only compulsory for all kinds of residential units (flats and detached houses) registered under a municipality; while it clearly allowed the exclusion of village houses in rural settlements by leaving the registration to TCIP on the choice of the owners. This was the result of grouping village dwellers as of low-income and, thus, they retain the right to direct financial support from the government through house loans in the case of an earthquake disaster (Gurenko et al., 2006).

However, with the exclusion of the villages in rural areas not administered under a municipality, the shares of the regions in the TCIP scheme also display the regional disparities as the study region, Eastern Anatolia, has only a share between 1.0 and 2.5 per cent given the fact that the region is, as emphasised throughout the thesis, highly rural with the highest number of village in Turkey and in poor economic condition. Even though it has a rather smaller area, the Southeastern Anatolia has a share of 2.0 per cent. Needless to say that only the share of the Marmara region, the most industrialised in Turkey, forms the half of the TCIP

²⁷ In Turkish, *DASK Zorunlu Deprem Sigortasi*. More can be seen from <http://www.tcip.gov.tr/>.

²⁸ "Since the TCIP's launch, some enforcement mechanisms have been implemented. For instance, homeowners must present a valid earthquake insurance policy in a government real estate registration office to register any real estate transaction. In addition, since April 2003 homeowners have had to present their insurance policy documents to open accounts for water and natural gas services. The same requirement is expected to be extended to electricity and telecommunications services" (Gurenko et al., 2006, p. 24).

portfolio (Gurenko et al., 2006). From the governmental perspective, the TCIP scheme was to reduce the direct financial burden on the state budget. In this regard, the insurance attempted to initiate a responsibility-sharing behaviour against disasters among the people living in urban areas. Notwithstanding, rural people exempted from the scheme still hold a conventional perspective that burdens all responsibility to the state, which is a '*benevolent father*' figure for the most (Gurenko et al., 2006, p: 71).

As a result, a housing project implemented after an earthquake in the rural eastern Turkey is largely funded by the state budget, which brings a top-down control over the reconstruction process, which is also discussed in Chapter 2. With this in mind, on one hand, Dikmen (2010), who studied different post-earthquake housing implementations across Turkey, claimed that the housing projects are not specifically designed for regions or areas; instead, they are planned and kept archived by the corresponding ministry to implement in the wake of a disaster with only small changes applied to the plans. In a general rural context, Parsa (2011) claimed that not only had the efforts of rehabilitation of the built environment in villages not brought about a permanent and successful solution, but that the state had also taken villages into consideration only after the earthquakes. On the other hand, on a scale beginning from a strong government role to strong community participation, Comerio (2014) evaluated the reconstruction process in China and Italy dominantly governmental, and the process in India and Japan a rather mixed-role allowing the non-governmental organisations and self-aided building programmes involve. Comerio placed Turkey between these two paired countries, implying that a stronger governmental role than the level of community participation, based on the reconstruction approach after the 1999 Marmara earthquake.

To discuss the argument more objectively, and also to begin to understand from architectural and user perspectives, a number of previous studies focused on the projects implemented in eastern as well as western Turkey are reviewed. Following the key elements drawn from the review in Chapter 2, the related findings of the studies are highlighted as far as possible, which also serve to consolidate the findings of the case studies in this thesis.

5.2 A review of the post-earthquake housing examples in Turkey

The evaluation of the post-earthquake housing implementations has been a favoured topic for research in Turkey given the frequent exposure to earthquakes and the critiques on the implementations.

To begin with, for example, according to a study²⁹ on the implementations in Gediz (in the province of Kutahya in western Turkey) after the 1970 earthquake³⁰, the houses were standardised to a plan of a single-storey with two bedrooms and one living room (Fig. 5.1), which was found irrelevant to the organisation of family living and traditional domestic patterns. The study stated that villagers used to live in two-storey buildings and keep their animals on the ground floor and reside on the upper floor. The study emphasised that the new houses had plumbing, but no clean water or sewer system was available in the villages. Apart from functional issues, the concrete floor was also inappropriate since people traditionally sit and eat on the floor.

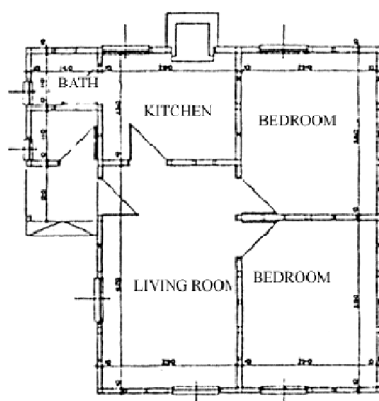


Figure 5.1 The layout of the houses built in Gediz, 1970.

In the 1995 Dinar earthquake³¹ (in the province of Afyon, western Turkey), in 46 villages, over 2,000 permanent houses and 1,400 barns were built. The house plan implemented had an area of 76 m² (Fig. 5.2) and the barn had 50 m² (Dikmen, 2010). According to the survey of Dikmen (2010), of 372 beneficiaries, none used their barn to keep their cattle. They used it to store coal and hay and built larger barns for their cattle. As for the reason, beneficiaries stated that the RC buildings and roofs were inappropriate for the animals, and that using stone masonry and wooden rafters helps to balance the moisture and heat inside. Most beneficiaries used a part of their barn as a bakery or built a small bakery area in their yard since traditionally each family bakes their own bread, a fact that was not considered in the housing projects. Dikmen (2010) also illustrated a few examples: one villager had added two large barns as he had had a number of livestock and a barn had not been delivered. He had also built an additional residence for his married son's family since the house was too small for all the

²⁹ Acerer, S. (1999) Afet Konutları Sorunu ve Deprem Örneğinde İncelenmesi, Unpublished Master Degree Thesis, Istanbul Technical University, Istanbul, Turkey (in Turkish), cited in Dikmen and Elias-Ozkan (2004).

³⁰ The earthquake struck with magnitude 7.1 M and caused more than a thousand deaths. Nearly 3,500 houses collapsed and 254 villages were severely damaged (Ambraseys and Tchalenko, 1970).

³¹ The earthquake struck with magnitude 6.1 M and killed 90 people. Over 3,000 buildings collapsed (Catal, 1997).

members. Another villager who had been delivered barn preferred not to use it given the reasons mentioned and had also built a larger one, storing coal sacks and hay in the barn. Additionally, regarding loans for reconstruction, Dikmen revealed that only 43% of beneficiaries had paid half of their loan even 13 years after the implementations whereas nearly 20% had not made any payment and stated they never would.



Figure 5.2 The layout of the housing implemented in Dinar (Dikmen, 2010), and exterior view (Enginoz, 2006).

A study³² on the implementations in Erzurum after the 1983 earthquake revealed that a majority found the living room too small and had enlarged the windows as they were also too small for natural lighting. The study noted that the vast majority of villagers had built separate and larger barns, and the majority would have preferred to have a barn on the ground floor to make use of the heat of their animals. Regarding the implementations after the 1970 Gediz, the 1976 Van, and the 1983 Erzurum earthquakes, Dikmen and Elias-Ozkan (2004) concluded that post-earthquake housing implementations had not been responsive at the local level as rural people's traditional way of living and physical and environmental considerations had not been taken into account when the projects were planned.

Parsa (2011) studied two villages, Teknecik and Hanza in the Refahiye district in Erzincan, after the 1992 earthquake and stressed that the materials used and techniques applied in housing construction in the villages were far from complying with standards for earthquake resistance. In terms of livelihood within a regional scope, Parsa noted that as the state had not made attempts to increase the volume and quality of farming and animal breeding, rural families had begun to lose their income stability and likely become poorer in time.

³² Kose, A. O. (1988) Afet Konutlarının Kullanıcı Sistemine Uygunluğunun Araştırılması, Unpublished Master Degree Thesis, Middle East Technical University, Ankara, Turkey (in Turkish), cited in Dikmen and Elias-Ozkan (2004).

In the 2000 earthquake in Çankırı³³, (a province in Central Anatolia), 1,221 houses were built in 69 villages (an average of 18 inhabitants in each village) and seven villages were relocated (Dikmen, 2005). Dikmen (2006) emphasised how the relocated villages were left unoccupied. For example, in Derebayındır village, only seven of 42 post-earthquake houses were occupied permanently. In Elden village, only seven of 87 and in Yuva village only six of 58 post-earthquake houses were occupied permanently (Fig. 5.3). A few of the remaining houses were occupied seasonally while the majority of the remaining houses were totally abandoned. Dikmen provided reasons for that: firstly, the villagers did not find the house plans appropriate, especially large households, secondly, they found the new locations inappropriate and distant from the original locations as some villagers still used the existing barns and other sheds since they could not afford to build new ones on the new sites.



Figure 5.3 The unoccupied housing implementations in Çankırı, Elden village. on the left. The occupied implementations built in the existing location in Buguogen village (Dikmen, 2006).

In Çankırı, the state adopted an owner-driven approach and provided house plans and loans to beneficiaries to build permanent houses. The beneficiaries were also given the option to adjust the house plans with the consultation of an architect. Three types of house plans with different sizes, 74, 85, or 104 m², were offered to beneficiaries and some adjusted the plan they chose to a great extent; for example, one beneficiary preferred to have larger rooms instead of small rooms with partitions (Fig. 5.4). The study found that dwellers that did not adjust their house plans and built the typical plan were not satisfied with the functional arrangement of the house after their occupancy. Regarding the small sizes of allocated private lots, Dikmen referred to an animal breeder who sold his 150 sheep since the barn unit was not large enough and there was no sufficient space to build another one. The first challenge encountered with the owner-driven approach was that beneficiaries were left in charge of hiring a contractor and managing construction. There were cases where the contractor took the loan from the beneficiary and

³³ The earthquake struck with 6.1 M_s and mostly destroyed the district of Orta and surrounding villages. Three people died and over 3000 buildings were damaged (Source: <http://www.mta.gov.tr/v2.0/deprem/?id=6hazirancankiri>).

escaped without completing the construction. The second challenge was that the loan provided was insufficient and some beneficiaries had to add an extra amount to complete their houses (Dikmen, 2005).



Figure 5.4 The typical 104 m² plan on the left; and the plan adjusted by a beneficiary on the right (Dikmen, 2005).

Dağıstanlı (2007) studied a highly remote rural village in Bingöl province in the Eastern Anatolia Region. The village has suffered due to migration. As of 1990, it had 115 inhabitants and as of 2000, it had 66, with nearly half of the inhabitants over 50 years old. About 90% had monthly income between 150 and 500 TL and more than half of all income based on agriculture and apiculture. Given the local geographical conditions, the use of fired clay bricks for masonry walls in RC buildings is insufficient for thermal insulation as during summer the interior is heated too much and in winter the interior is not well heated and rapidly loses warmth (Dağıstanlı, 2007). The state implemented one of the standard house plans as shown in Figure 5.5. Most buildings were constructed in the footprint of collapsed houses or on a lot owned by the beneficiary. Dağıstanlı noted that the settlement layout appeared quite random and there is no documentary evidence clarifying how the buildings were located (Fig. 2.36). The study revealed that the majority were satisfied with the number and size of the rooms. The vast majority were satisfied with the size of windows for natural lighting although their disproportionate size, 100x100 cm for a 12 m² living room, caused heating problems.

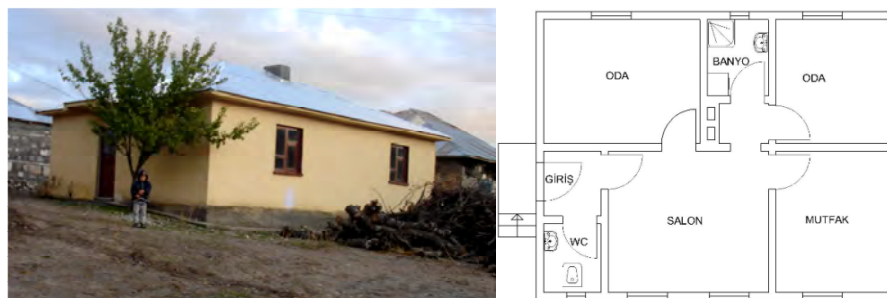


Figure 5.5 The plan of post-earthquake permanent houses built after the 2003 Bingöl earthquake and a house from Alagoz village (Dağıstanlı, 2007).



Figure 5.6 A view from the Alagoz village (Dağıstanlı, 2007).

Tercan (2008) focused on relocated villages after the 2004 earthquake³⁴ in the district of Dogubeyazıt in the province of Agri. Kutlubulak village was fully relocated, and the houses were supplied with clean water (Fig. 2.37). In Sağlıksuyu village, 30 houses were built on the relocation site and 56 were built on the former site. Yığınçal village was noted as the most disadvantaged given the lack of clean water and its remoteness. In an attempt to provide better infrastructure, 80 families from the village were relocated 24 km away to nearby Doğubeyazıt district. However, 31 families continued animal husbandry in the former village as they could not keep their livestock at the new location because they did not have a private lot. Hence, as Tercan noted, they still used the damaged houses in the former settlement. Tercan surveyed 55 dwellers, of which 33 were illiterate. The villagers were notably poor as 42 of 50 had green card insurance provided by the state and eight had no insurance. Tercan (2008) emphasised that the houses shared between two or more married couples (married brothers and sisters) were separated after the implementations as each was allocated a separate house. In this regard, Tercan emphasised that before the implementations, young married couples living with parents had a tendency to migrate out the village (mostly to Istanbul). However, with the implementations and the separate houses they were allocated, they had more of a tendency to stay in the village. The house plan implemented is provided in Figure 2.38.



Figure 5.7 View of the relocated settlement of the village of Kutlubulak (Tercan, 2008).

³⁴ The earthquake struck with magnitude 5.2 and the epicentre was Yığınçal village. Eighteen people died (Source: http://www.todayszaman.com/latest-news_earthquake-shakes-eastern-turkey_10004.html).

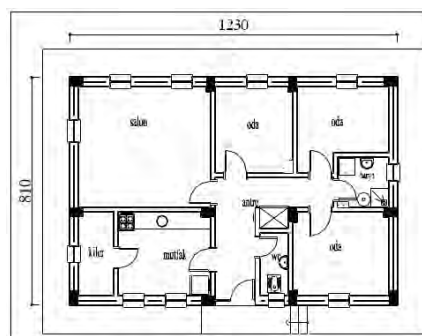


Figure 5.8 The plan of the houses implemented, below (Tercan, 2008).

Onder et al. (2010) surveyed 100 households randomly selected from 168 houses implemented in Duzce (in the Marmara region of western Turkey) in the Beyciler social housing project³⁵. The project is located in a semi-rural area, and two-storey houses (Fig. 2.39) were built through community participation. The beneficiaries were identified from the poor with the lowest income, and the reconstruction approach was mixed as the structural installation of RC buildings was completed by contractor, and beneficiaries then worked to complete the interior. This mixed approach allowing community participation lowered costs, increased the sense of ownership, and encouraged relationships between the neighbours to-be (Arslan and Unlu, 2006). Accordingly, Onder et al. (2010) found that the dwellers had high levels of satisfaction with the houses (95% of participants was satisfied with the size of house and rooms for an average 4.6 on a five-point Likert scale).



Figure 5.9 The view of the Beyciler social housing project in Duzce (Onder et al., 2010).

Inal (2008) interviewed 43 dwellers in the district of Golyaka, also a semi-rural area in Duzce. Permanent houses were built as two- to three-storey blocks with a RC tunnel moulding system. The flats have a standardised plan of 74 m² with two bedrooms. However, this type of construction caused some dwellers to sell their flats and build their own detached houses in lot

³⁵ The project was granted by the International Blue Crescent and the Catholic Relief Service (Arslan and Unlu, 2006).

they owned. In terms of overall satisfaction with the houses, the average score was 3.55 on a five-point Likert scale. In term of house plans, dwellers stated that having an all-in-one bathroom (toilet, shower, and sink) is not functional. Half of the dwellers relied on the earthquake resistance of their buildings because of the structural system and materials.

Although the study did not specifically focus on the rural, Arslan (2009) surveyed 50 relocated and 50 non-relocated dwellers in Duzce and found that relocated dwellers had lower place attachment. Further, home owners had stronger place attachment than tenants, and they found their built environment more attractive than tenants did.

Oral et al. (2015) surveyed 174 people in Aşkale, the district affected in the 2004 Erzurum earthquake, and Erciş, the district affected in the 2011 Van earthquakes, and found that having previous earthquake experience has a significant effect on level of preparedness. Surveyed married couples and home-owners had higher levels of preparedness than single people and tenants. Nevertheless, level of education, gender, age, and occupation had no significant relation with the level of preparedness. Oral et al. (2015) also emphasized the dominant role of the state in Turkey following disasters in addition to highlighting the religious perspective of people, which leads them to believe earthquakes are an act of God.

The studies thus far illustrated a variety of the post-earthquake housing implementations across Turkey. Their findings support the conclusion that the implementations are standardised and local knowledge or sources are not considered. However, there are positive implications (e.g. prevention of migration) as many as negative implications (e.g. completely abandoned relocation site) pointed in the studies. With this in mind, in order to develop an in-depth and more coherent understanding of the issue from the dwellers' perspective, a multiple-case study is conducted by focusing on the housing projects completed between 1992 and 2012.

5.3 Profiles of the case studies

To better observe the transformation in the rural built environment though the post-earthquake permanent housing projects, a look from the past up to today addresses the objective of the chapter and the study. Three case studies presented are the provinces of Erzincan, Erzurum, and Van; and they are ordered chronologically. This is a meaningful and easy way to observe the development of the post-earthquake permanent housing reconstruction strategy of the state. To say, by looking first to the current conditions of the earlier examples, it is easy to understand how the most recent examples might be influenced in the future. In addition, an inclusive

provincial and historical research was carried out in order to better interpret the findings within the regional characteristics and to more accurately illustrate the post-earthquake reconstruction strategy of the state. It is suggested that the reader look first at Appendix III to gain a background and develop a preliminary perspective about the area studied. The historical research of the case studies focuses on the earthquake experiences of 1939 in Erzincan, 1983 in Erzurum, and 1976 in Van. The appendix also includes the extended details of the sample villages in each province, from which the questionnaire and interview data of the study are collected. Each case study examined villages, five from Erzincan, five from Erzurum, and seven from Van. As explained in Chapter 4, the methods used to collect primary data were questionnaires and semi-structured interviews. Each sample village was systematically analysed in terms of satellite maps showing their previous location and relocation sites (if they were relocated), illustrations of settlement layouts, the number of dwellings and population size, and other characteristics observed through fieldwork. Satellite maps obtained from Google Earth and photographs taken by the researcher were used to physically evaluate the settlements. Secondary data, including information from national statistics, newspaper articles and online media, and previous academic works, were combined with the researcher's field observations from surveys and interviews. Preliminary results from the questionnaires and interviews were used to illustrate the socio-economic and cultural characteristics of participants. Figure 6.1 illustrates the locations of the three case studies, and the chapter ends with a review of the implementations examined in the case studies.



Figure 5.10 The locations of Erzincan, Erzurum, and Van Provinces in Turkey (Sources: http://www.csb.gov.tr/iller/il_harita/erzincan_harita.png, http://www.csb.gov.tr/iller/il_harita/erzurum_harita.png, http://www.csb.gov.tr/iller/il_harita/van_harita.png, respectively).

5.3.1 The province of Erzincan

The 1992 earthquake

On 13th March 1992, Erzincan suffered a destructive earthquake with a magnitude of 6.8 (M_s), which was the most severe earthquake in the area since the 1939 disaster that created a rupture 45 km long and 29 km in depth (Demirtaş et al., 1994). Several cases of liquefaction were observed around the settlements of Ekşisu, Karasu, Mertekli, and Altınbaşak, in addition to the landslides induced by liquefaction along roads and the river (Ambraseys et al., 1992; Hasgür & Aydan, 1996). The epicentre was less than 8 km to the city centre area, close to the village of Yalnizbağ; thus, the earthquake caused serious devastation in urban as well as rural areas (Mitchell, 1993; Demirtaş et al., 1994). Including the surrounding 150 villages, the structural damage from the earthquake was estimated at over 7,000 collapsed or heavily damaged structures, around 10,000 with medium damage, and more than 15,000 with repairable damage (Celebi, 1993; Mitchell, 1993; 13 Mart 1992 Erzincan Depremi, 1993). More than 650 people died, 350 were rescued from collapsed structures, 3,850 were injured, and 16,000 were left homeless. At the time of the earthquake, the population of Erzincan was approximately 300,000, with one-third of residents living in the central area. Overall, the disaster caused the temporary displacement of 40% of the population (Ambraseys et al., 1992; Celebi, 1993). Furthermore, the earthquake disrupted the regional economy of Erzincan due to huge loss of livestock, over 11,000 cattle, and the collapse of about 2,500 barns in the surrounding villages (Mitchell, 1993; Gülkan & Ergünay, 1995; Grosser et al., 1998).

Aftershocks occurred for almost three months, with nearly 6,000 recorded during this time. Most aftershocks were equal to or less than magnitude of 4.0 (M_s), but one remarkable aftershock with magnitude of 6.1 (M_s) struck the area of 30 km southeast of Erzincan on 15th March 1992. This relatively severe aftershock extended the impact zone (Demirtaş et al., 1994; Fuenzalida et al., 1997; Grosser et al., 1998). Including the aftershocks, half of the deaths were in the city centre due to the collapse of more than 200 multi-storey buildings (Ambraseys et al., 1992). The extent of structural damage in the rural settlements was so large that it required massive reconstruction as in the case of the 1939 earthquake (Figure 5.11). Damage was heavier in the villages located at the skirts of the mountains near the North Anatolian Fault (Williams et al., 1992). Despite the lessons learnt from previous experiences and shelf-ready emergency plans, disaster response to the earthquake was not very effective. A number of

national and international teams and organisations cooperated to provide assistance (Erdik et al., 1994).

Teams from other countries provided the equipment needed for search and rescue, and also donated tents and blankets (Mitchell, 1993; Meguro & Nakano, 1993). Because the three main hospitals of Erzincan were heavily damaged, health services and medical care were seriously disrupted. As a result, injured and rescued people were transferred to hospitals in the adjacent provinces, particularly Erzurum. In addition, a temporary hospital was established by the Turkish Red Crescent (Meguro & Nakano, 1993; Gülkan & Ergünay, 1995). Over 17,000 tents from the Turkish Red Crescent and over 9,000 tents from the UN were delivered to survivors (Gülkan & Ergünay, 1995). Two weeks after the disaster, prefabricated temporary shelters were erected as shown in Figure 5.12 (Celebi, 1993).

The extensive damage caused by the earthquake was associated with illegal revisions in the settlement plans (Sengezer, 2000). However, the causes of heavy structural damage were generally linked to poor quality of material and workmanship, insufficient structural detailing, inappropriate design layouts, lack of control mechanisms during construction, and deficiencies in the building and seismic design code enacted in 1975, which was especially criticised as not



Figure 5.11 from the top-down: a heavily damaged traditional building in the village of Altınbaşak; a damaged adobe brick infill wooden frame house in the village of Altınbaşak; a collapsed single-storey adobe and clay brick masonry house in the village of Yalnızbağ; and a collapsed stone masonry school building in the village of Mecidiye (Williams et al., 1992).

considering the seismicity of the region. Regarding rural settlements in particular, the causes of heavy structural damage included the use of materials such as rubble stone, adobe, and clay bricks, the use of low-quality mortar such as a mixture of earth and mud, the thickness of walls, shallow foundations and the use of rubble stone to construct foundations, and the application of earth-infill flat roofs that resulted in extreme loads on the walls (Ambraseys et al., 1992; EERI, 1992; Williams et al., 1992; Celebi, 1993; Mitchell, 1993; Meguro & Nakano, 1993; Güllkan & Ergünay, 1995). Therefore, the authorities favoured the demolition and reconstruction of poor quality buildings instead of their repair, even in the event of minor damages (Ambraseys et al., 1992). Otherwise, when people rebuild their post-earthquake houses on their own, they usually repeat similar structural faults and even reuse some material from damaged buildings (Saatcioglu & Bruneau, 1993). In contrast to the heavily damaged masonry structures, the performance of timber houses built with prefabricated light-wood panels after the 1939 earthquake was remarkable as the houses suffered little damage (Williams et al., 1992).

The reconstruction process

Direct losses from the earthquake were about \$445 million, and indirect losses were about \$222.5 million. The total cost of reconstructing Erzincan was approximately \$700 million, with one-third of the amount (\$240 million) a loan from the World Bank (Gurenko et al., 2006; Celebi, 1993; Mitchell, 1993). Residential reconstruction was required for 2,200 single-storey detached houses in rural areas and 3,040 multi-storey apartment blocks in the urban areas, reinforcement was required for 2,540 units in villages and 2,800 units in central areas, and repairs were required for 4,400 units in villages and 3,850 units in central areas. Reconstruction was scheduled to be completed by December 1992 (13 Mart 1992 Erzincan



Figure 5.12 from the top-down: the units of the temporary hospital by the Turkish Red Crescent; the inside of the temporary hospital (Meguro & Nakano, 1993); and, the temporary prefabricated houses for the survivors (Celebi, 1993).

Depremi, 1993). The preliminary results of damage assessment surveys conducted for about 45,000 units were available in less than a month and were announced on 6th April 1992.

Per the usual legal process, residents were allowed two months to request a reassessment of their properties (13 Mart 1992 Erzincan Depremi, 1993). Concurrently, official teams conducted surveys for site selection, mapping, expropriation of land and property, and identification of beneficiaries (Gülkan & Ergünay, 1995). With the aim of restoring the regional economy based on animal husbandry, reconstruction of 2,885 barns, each measuring 50 m², was completed by June 1994; the state granted over 10,000 cattle, worth of nearly \$2.1 million, to villagers as well (Kiral, 2000).

The state adopted an agency-driven approach and used a bidding process to hire contractors to build for each settlement. The bidding was conducted in two phases; the first consisted only of implementation of permanent housing, and the second consisted of shops and commercial and government buildings as well as the remaining part of permanent housing (Williams et al., 1992). For reconstruction of the rural settlements, an agency-driven approach was used if more than fifteen houses were to be built in one settlement; if the number of the houses to be built was less than 15 in one settlement, residents were allocated an amount to help them rebuild their houses on their own, i.e. an owner-driven approach. With the

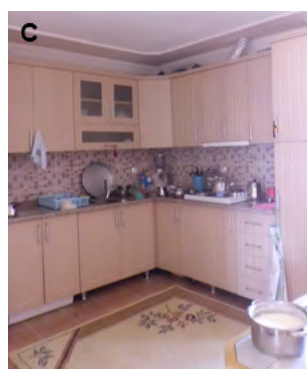
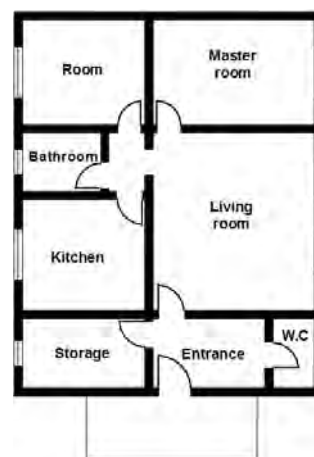


Figure 5.13 from top-down: the plan of post-earthquake permanent house; a view from entrance, from living room and kitchen of a beneficiary's house.

second approach, 1,382 houses were rebuilt by their owners in 148 settlements (13 Mart 1992 Erzincan Depremi, 1993).

A typical house plan was adopted for the rebuilt rural housing and was applied for both the agency and owner-driven approaches. The cost of reconstruction per residential unit in rural areas was \$11,550; the cost of rehabilitation of a damaged rural house was \$5,775; the cost of repair of a rural house with minor damage was \$1,500; and the reconstruction of a barn 50m² in size was about \$2,500 (13 Mart 1992 Erzincan Depremi, 1993). The size of a typical reconstructed house was nearly 80 m². The plan is shown in Figure 5.13. The houses have a single storey and were built as RC frame structures with fired hollow clay brick infill walls. The door and window frames are wooden, and roofs were covered with terracotta tiles. Barns were built in the backyard of each rural residential unit.

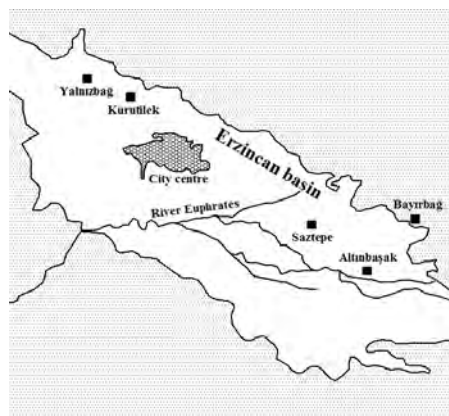


Figure 5.14 The abstract map shows the locations of the villages sampled for the case study of Erzincan.

The study

The fieldwork was conducted between 2nd and 4th September 2013 in five villages in rural Erzincan. All villages were located in the most affected area. The villages sampled are *Altınbaşak*, *Kurutilek*, *Saztepe*, *Bayırbağ*, and *Yalnızbağ* (Fig. 5.14). The completion of 80 questionnaires was not a challenge since the residents were willing to participate in the survey. In contrast, most did not agree to participate in semi-structured interviews because they were recorded. Only one participant was interviewed.

5.3.2 The province of Erzurum

The 2004 earthquakes

On 25th March 2004, an earthquake with magnitude of 5.1 (M_s) struck the district of Askale in western Erzurum. On 28th March, another earthquake with magnitude of 5.3 (M_s) shook the same area. Although the earthquakes were moderate in severity, because they were close to the surface (5-10 km), the destruction caused was significant, particularly in the surrounding villages (Denizlioglu et al., n.d.). Both earthquakes were generated in the eastern part of the

Askale Fault (Gok et al., 2007); thus, the villages located between the faults of Askale and Kandilli were severely affected, e.g. Tazegul and Alaca (Tarhan, 2004). Figure 5.15 shows examples of collapsed masonry structures.

A number of aftershocks followed both earthquakes. In the hour after the first earthquake, 21 aftershocks were reported (DHA, 2004). The earthquakes caused several rock falls and landslides in peripheral areas and along the highway and railway line (Dogan et al., 2004). The two earthquakes caused nine casualties and 32 injuries. In comparison with the earthquake that struck the province of Bingol on 1st May 2003 that affected 350 villages and caused 177 fatalities (EERI, 2003), the loss in Erzurum was considerably lower despite the large impact zone, which covered 75 villages. Over 4,000 people were directly or indirectly affected by the earthquake, and approximately 60% of livestock in the area was lost (IFRC, 2004; UN-OCHA, 2004). The Turkish Red Crescent distributed over 4,000 tents as temporary shelters and provided mobile health teams (IFRC, 2004).

The reconstruction process

Reconstruction of the villages was undertaken by the ministry. TOKI was assigned only to the construction of social



Figure 5.15 from top-down: a collapsed barn in the village of Alaca; a collapsed masonry house in the village of Tazegul; a collapsed house with very thick walls and heavy roof; and, a view from a tent settlement for temporary sheltering which is erected by the Turkish Red Crescent (Dogan et al., 2004; Korkmaz, 2007; Denizlioglu et al., n.d.; IFRC, 2004).

housing in districts with relatively large populations. Prior to the start of reconstruction, some complaints were raised by villagers due to the results of damage assessments. The complaints were mostly raised by villagers whose houses had been evaluated as moderately or lightly damaged, which prevented them from being a beneficiary and allowed them to receive only a small amount to help with repairs. Damage assessments were conducted separately for residential units and barns. As a result, some villagers were dissatisfied as they were listed as the beneficiary of only a residential unit or a barn, while some were listed as the beneficiary for both. A total of 975 families were allocated only post-earthquake permanent houses, 318 were allocated only barns, and 846 were allocated both, according to records of the ministry. Reconstruction in most villages was completed by the end of 2004 (Gok et al., 2007). The decision of reconstruction-in-situ and reconstruction at a relocated site was made based on the same criteria used for the 1983 earthquake (See Appendix V). Only a few villages were exceptional cases. For example, although all the buildings in the village of Alaca were destroyed by the earthquake, the houses were reconstructed in the same location. There were also a few cases in which villages were partially

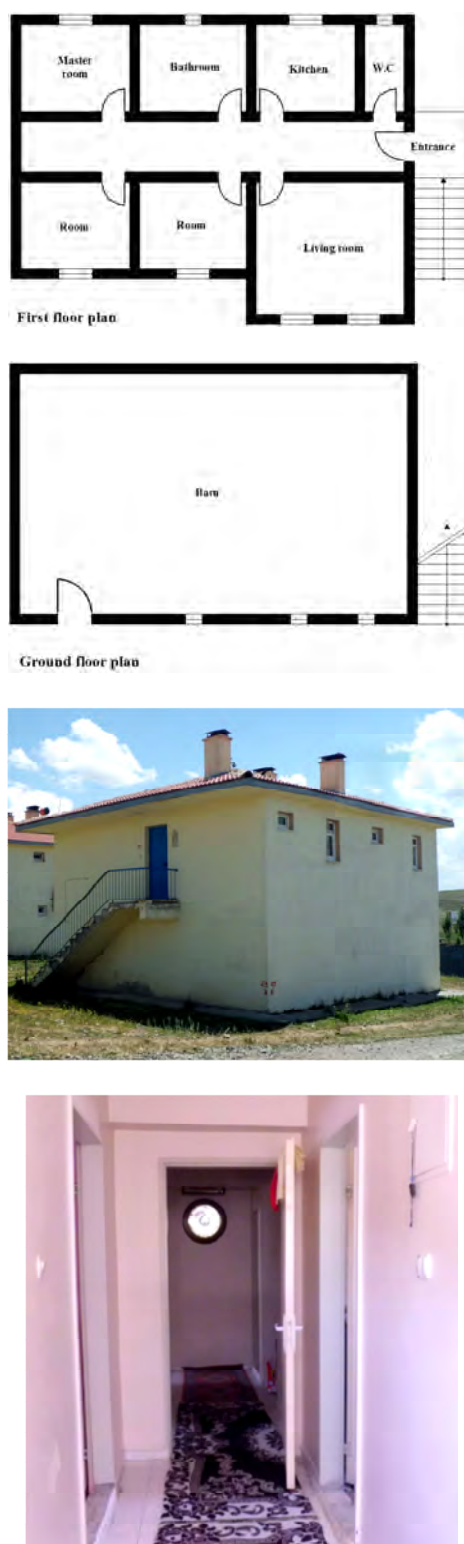


Figure 5.16 from top-down: the plan of the residential floor of two-story post-earthquake permanent house; the plan of ground floor as barn; an exterior view of two-story house; and, a view from the residential floor of the house.

relocated since some villagers insisted on staying in the same location. Due to their requests, their new houses were built in the same locations as the damaged buildings. The villages of Cigdemli and Tazegul are examples of such cases.

Another issue emphasized by previous researchers was the selection of relocation sites. On one hand, some sites were located on fertile land and were thus deemed inappropriate since they reduced the cultivation area of villagers. On the other hand, some relocation sites were near main roads and were thus deemed as beneficial since most villages in the area often suffered blocked roads due to heavy snow in winter. Relocation of such villages to nearby main roads enabled easily access any time of the year (Gok et al., 2007).

The reconstruction cost was estimated at 15,000TL (~\$7,000) for a barn unit, and 61,000TL (~\$28,800) for a two-storey building. Accordingly, villagers listed as beneficiaries were provided loans with the condition they are repaid over 20 years with no interest. However, as a special case in Erzurum, on 8th February 2012 a decree was issued that 50% of the amount of the loan was to be forgiven and it was mandatory to repay only the remaining 50%.

This decree was issued for two reasons. The first was the low income level of the rural

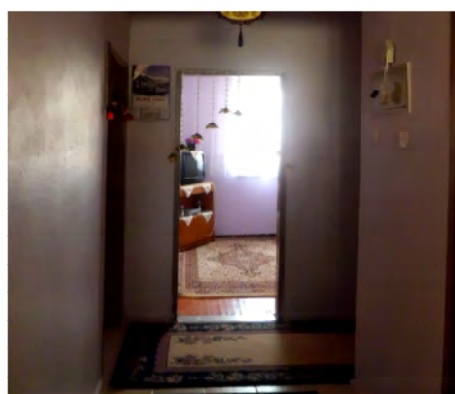
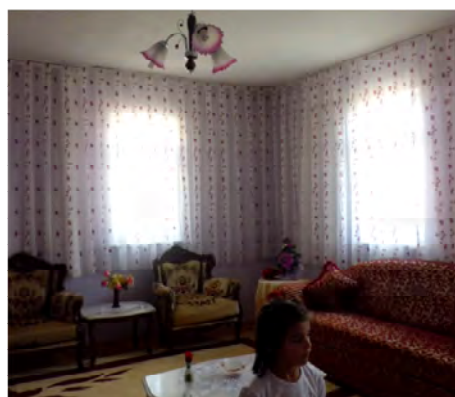
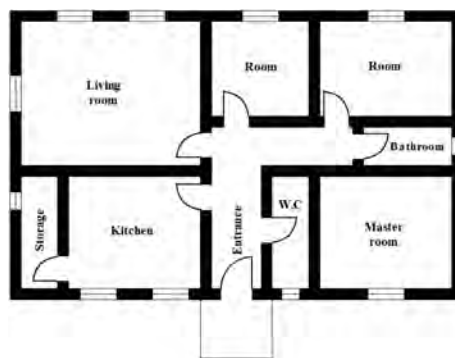


Figure 5.17 from top-down: the plan of single-story house, an exterior view of a single story house unoccupied; an interior view of the living room of a house; an interior view from the entrance of the house.

dwellers in the province, which was far less than that in the west of the country. The second was the number of uninhabited reconstructed houses; since beneficiaries could not afford to pay instalments regularly, they preferred or were forced to abandon their houses due to the legal process (TBMM, 2012), which clearly explains the large number of inhabited houses observed during fieldwork.

Single-storey houses were delivered to the beneficiaries of only a residence unit, and two-storey buildings were delivered to families who were the beneficiary of both a residence unit and a barn. The gross area of the standard single-storey house was 99.63 m² with usable area of 79.74 m². The area of the residential unit in the first floor of a two-storey building is 88.70 m² with usable area of 73.80 m². A study found that the area of these houses is insufficient for families with more than five members. The structure of the buildings is RC frame with hollow brick masonry infill walls. The concrete quality is C20, which meets the minimum conditions of the seismic code (Onder, 2010).

In all the houses, the main door is simple cast iron, the interior doors are wood, and the profiles of the windows are PVC. The toilet, bathroom, and storage each measure 60x60 cm and bedrooms, the living room and kitchen each measure 80x140 cm. The roof slopes 33% in four directions and is covered with terracotta roof tiles. The floors are wood laminate in bedrooms and the living room, with ceramic tiles in the remainder of the house, including the bottom half of walls in the bathroom and toilet. In the plan of the single-storey house, there is a separate space for storage at the back of the kitchen, and the sizes of the bathroom and toilet are nearly same (Fig. 5.16).

In the plan of the two-storey building, the kitchen is spacious, but there is no extra space for storage. The bathroom is excessively large and is more spacious than the toilet. In addition, the corridor is also quite spacious in the plan, whereas it is narrower and shorter in the plan of the single-storey house (Fig. 5.17). Normally, this could be criticised as the loss of usable space in the house, but, in this case, it provides better natural ventilation and lighting as the windows of the rooms look directly into the corridor. However, the entrance to the residential unit on the first floor is accessed via the exterior stairs, which is certainly not appropriate for the weather conditions of the region.

With regard to the barn unit on the ground floor, it has been often emphasised that it causes noise, bad odours, and dampness in the residence on the upper floor. Furthermore, the small windows have been deemed insufficient for natural ventilation.

Generally, it is suggested that a barn be located at a minimum distance of 10 metres and a maximum distance of 50

metres from a house (Onder, 2010). Furthermore, regarding the size of barn unit, since the families in the region often have large cattle breeds, the barns provide sufficient space for only a few animals and are not appropriate for larger livestock (Gok and Girgin, 2001; Gok et al., 2007; Onder, 2010).

The study

This background information informed the fieldwork investigating the adaptation of rural dwellers living in the post-earthquake permanent houses in rural Erzurum carried out in five sample villages. The villages are Çiğdemli, Alaca, Tebrizcik, Paşayurdu, and Tazegül and all are situated between Kandilli and the city centre of Erzurum, which was the area most severely affected by the earthquake in 2004 (Fig. 5.18). The field was visited between 30th August and 1st September 2013, after visiting the province of Van. A total of 80 questionnaires were completed by residents in these villages, and a few were already familiar with such research. The interview process was not as difficult as in Erzincan. A total of 13 participants volunteered for semi-structured interviews as a follow-up after completing the questionnaire.

5.3.3 The province of Van

The 2011 earthquakes

On 23rd October 2011, a strong earthquake with magnitude 7.2 M_w struck Van. The epicentre was in the north of Van, and the tremor was also felt in adjacent provinces surrounding Lake Van. Later, a moderate earthquake with magnitude 5.6 M_w struck on 9th November 2011. The epicentre was in the south of Van. Both earthquakes caused extensive damage over a large area, mainly in the villages located between Lake Van and Ercek (Karanci et al., 2011; Albin

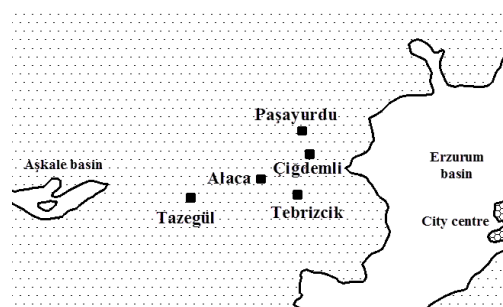


Figure 5.18 The abstract map shows the locations of the villages sampled for the case study of Erzurum.

et al., 2012; Erdik et al., 2012). Several landslides were observed in the affected area due to the liquefaction (AFAD, 2011). Over the following five months, nearly 10,000 aftershocks were recorded by the national observatory centre. The magnitudes of 12 of the aftershocks were between 5.0 and 6.0 M, and 176 were between 4.0 and 5.0 M (AA, 2012). A total of 644 people died and 252 were rescued (Karanci et al., 2011). Damage assessments were completed for nearly 45,000 buildings in urban and rural settlements. Overall, 28% of buildings assessed were heavily damaged and 35% had minor damage. Approximately 68,000 residential units were assessed, of which 20% were heavily damaged and 14% were moderately damaged (TMMOB, 2012).

Within the first 72 hours after the earthquake on 23rd October, 5,267 search and rescue teams, 2,976 health service personnel, and 11 mobile hospitals were sent to the field by AFAD. In addition, 76,800 tents and 4,100 container units were distributed. A number of foreign countries helped with emergency aid by sending various essential equipment (e.g. blankets, heaters, and beds), and supplying over 29,000 tents and 250 container units for temporary shelter. Apart from the tent and container units distributed to the villages, there were 14 temporary tent settlements established for 14,000 survivors in Van

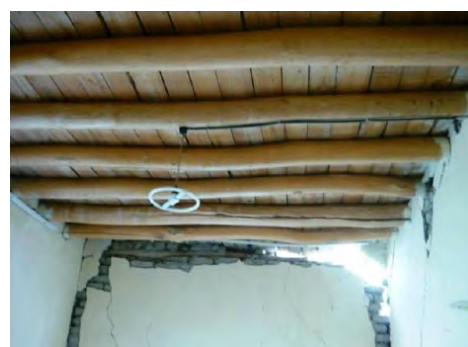


Figure 5.19 from top-down: a totally collapsed masonry building; a village school with poor concrete ring beams and stone masonry walls totally collapsed; a traditional timber log roof and a damaged side wall; and, an aerial view of a temporary tent settlement erected by AFAD near the urban centre (AA, 2011; Kızılkant et al., 2011; Karancı et al., 2011).

About 36,000 survivors were temporarily relocated to guest houses of the state in the south-eastern and western regions of Turkey; a further 14,000 left Van by themselves to find temporary accommodation (AFAD, 2012). However, this strategy was criticised since it made migration out of Van easier, which is already a regional issue (TBB, 2011). To house large livestock in the area, 3,500 barn tents were provided by the Ministry of Food, Agriculture and Livestock (AFAD, 2012).

Damage assessments began after the first tremor and lasted four months, including preliminary and final assessments. The initial assessments for 93 villages administered by the central municipality of Van were completed between 15th November 2011 and 2nd December 2011. The results were announced on 7th December 2011 to the villagers via the reeves. The detailed damage results were announced to the public on 27th December 2011, and the following month was a legal period during which the owners could request a reassessment of their properties if they were displeased with the results. Within the next the months, the final assessments were completed and the beneficiaries were listed (GazeteVAN, 2012; AFAD, 2014).

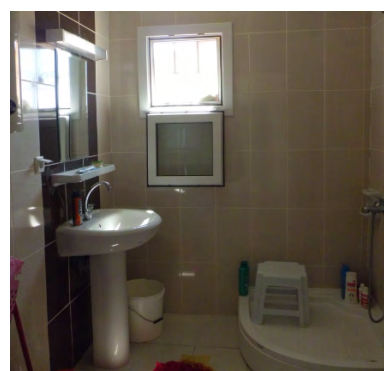
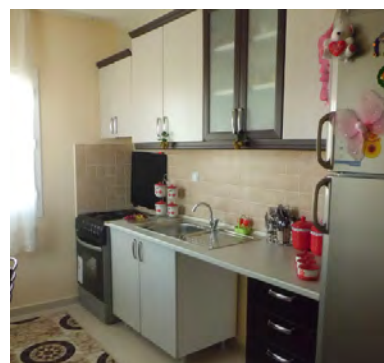
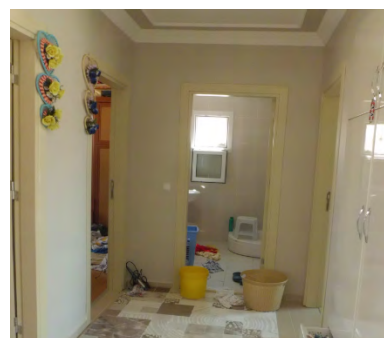
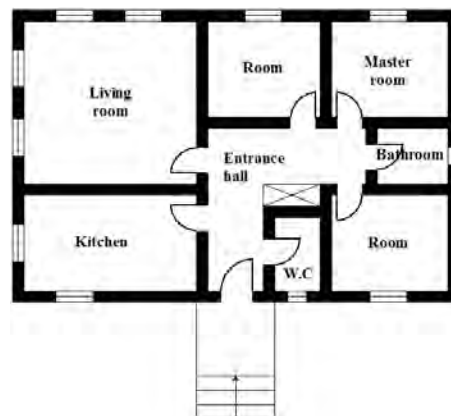


Figure 5.20 from top-down: the plan of light steel frame houses; an interior view from the entrance; a view from the kitchen; and the view of bathroom.

However, despite rapid completion of damage assessment, some issues were highlighted. For example, due to the lack of local personnel to conduct disaster management efforts, 90% of the officers working in the help desk in Erciş were school teachers who likely had no previous experience or knowledge about such a crisis (Karanci et al., 2011). Furthermore, the assessment technique was also found to be insufficient since the buildings were assessed only visually and without using any technical tools. The property owners were also left with no documents or statements informing them about the status of their buildings, which caused concerns (EERI, 2012).

The reconstruction process

Overall, based on the results of the damage assessments, 39,804 families whose residences were heavily damaged or totally collapsed were listed as beneficiaries of post-earthquake permanent houses. More specifically, in 93 villages under the administration of the central municipality of Van, 5,976 families were listed as beneficiaries, and in 84 villages under the administration of the district municipality of Erciş, 2,810 families were listed as beneficiaries. Further, a total of 3,553 barns were also built for the beneficiaries whose barns collapsed in the earthquake (Işık,

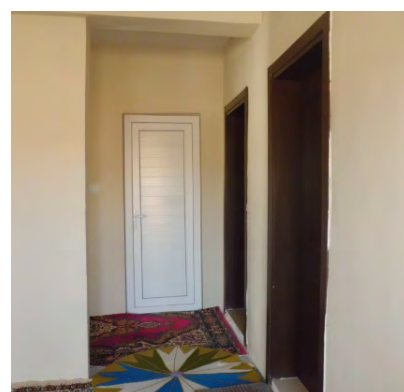
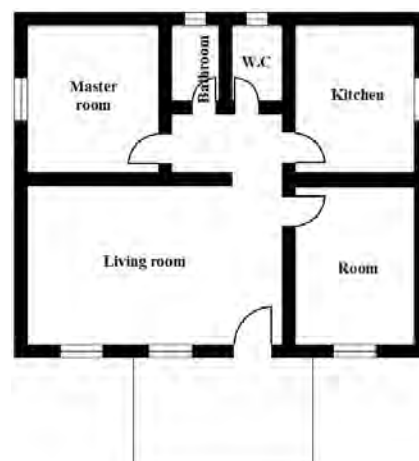


Figure 5.21 from top-down: the plan of the house with two bedrooms; an interior view from the entrance; a view of the living room; and, a view from the kitchen.

2012). Accordingly, the reconstruction process began in the early spring of 2012 and was scheduled to be completed by the end of the year. Similar to previous strategies, a number of contractors were hired to rebuild the villages. However, this strategy was confusing in the case of Van, since in theory it had been decided that the houses would be built through the owner-driven approach as each beneficiary was allocated a house loan. Notwithstanding, in practice, construction turned into the agency-driven approach as local authorities from AFAD hired contractors to build the houses, and the house plans were taken from the catalogue of AFAD. In other words, AFAD was the agency controlling and conducting post-disaster housing reconstruction through hiring contractors.

This case is not different from the approaches applied in the previous implementations explained thus far, but confusion was born from the misuse of terms in the approaches. This issue is discussed further in the conclusion chapter.

However, what was particular in Van was the involvement of TOKI in the reconstruction process. As the national housing development agency, TOKI generally takes part in the reconstruction of urban areas. The implementations of TOKI

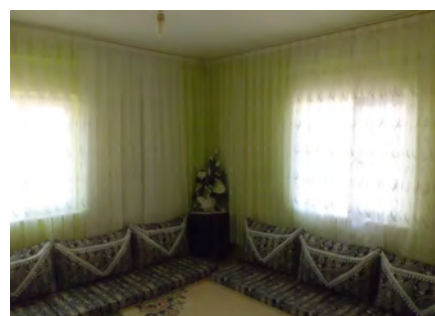
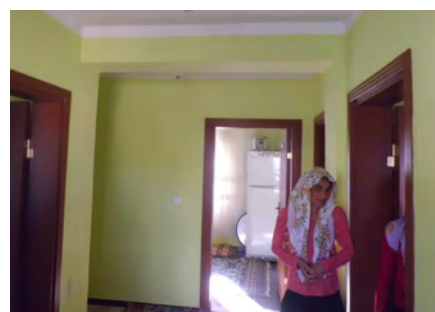
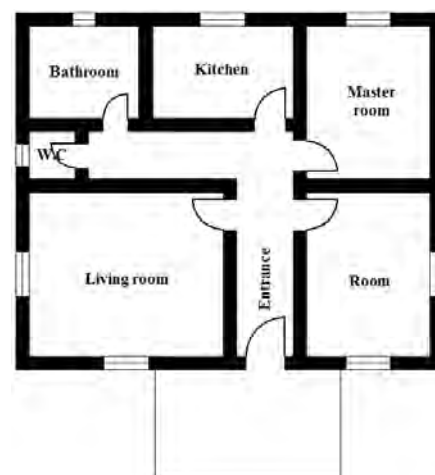


Figure 5.22 from top-down: the plan of the house with two bedrooms; a view from the entrance; an interior view from the entrance toward the hall; a view from the living room.

consist of multi-storey residential buildings, malls, schools, and mosques.

The villages of Topaktaş, Özkaynak, and Dağönü were selected from 177 villages to be built as pilot projects with structural system and materials differently from previous post-earthquake housing projects. The houses were planned to be built as single-storey, light steel-frame structures. A total of 100 houses with barn units were planned for the village of Topaktaş, 50 for the village of Özkaynak, and 75 for the village of Dağönü. However, Dağönü and Topaktaş villages were united in a relocated site for reconstruction and a total of 175 houses with barns were built. TOKI completed construction and delivered the houses to beneficiaries by the end of September 2012.

The plan of the light steel frame houses is given in Figure 6.30; the house has three rooms and one spacious living room. All of the interior finishing was completed, including the sink and shower in the bathroom and the cupboards in the kitchen. As construction was conducted by one contractor and its sub-contractors in the three villages, the quality of all of the buildings and the finishing materials used were the same. The size of the house is approximately 100 m² and the amount of the house loan allocated to beneficiaries

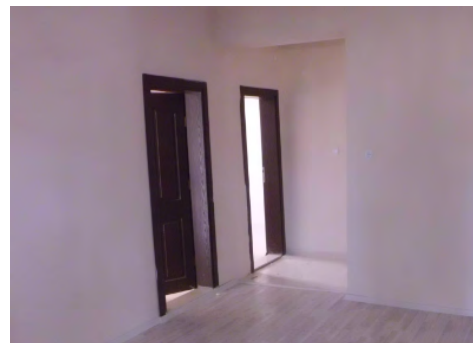
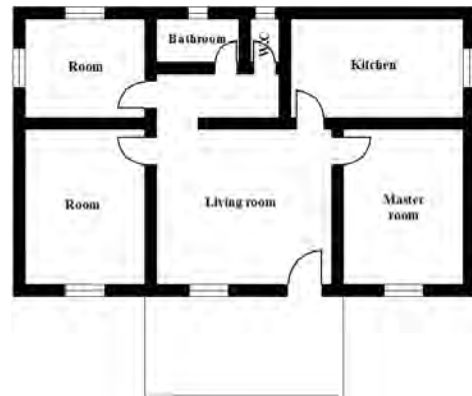


Figure 5.23 from top-down: the plan of the house with three bedrooms; an exterior view of the house with this plan, under construction in the village of Gedelova; a view from the inside of living room; and, a view from bedroom.

was 70,000TL (~\$33600), which is to be paid back after 2015 in monthly instalments for 20 years with no interest. The estimated amount of each instalment is around 200TL (~\$96). The amount of the loan for the barn units was 15,000TL (~\$7200) and was added to the house loan if the beneficiary was delivered both.

In the remaining 174 villages, the structural system for reconstruction was same as described for previous villages, with an RC

frame with hollow concrete block infill walls. Unlike the implementations in Erzurum and Erzurum, more than one type of house plan was offered to villagers. One of the house plans applied, shown in Figure 5.21, has two rooms and one living room. The main door of the house opens directly into the living room as there is no separating wall. It can be said that this plan is not appropriate to the climate of the region, considering the winter conditions. The existence of a separating wall would prevent interior heat loss in cold weather and would provide a small welcoming space.

The second type of house plan also has with two rooms and one living room. However, it has differences compared to the previously described plan. For example, there is an entrance hall, which continues as a corridor. The proportions of the bathroom and toilet is relatively different; however, the large area of the bathroom can be considered as wasted space that could have provided further separate space that could be used for storage, which would be highly useful for residents. The plan of the house and its interior views are provided in Figure 5.22.

The size of the house is around 104 m² and the amount of the house loan allocated for these two types of buildings was 44,000TL (~\$21,150), and is to be paid back with the same plan. However, there was also an option for the families who preferred to have a larger house with three rooms instead of two rooms. In this regard, the families had to pay an extra amount, around 6,000TL (~\$2885), to the contractor as the fee for the extra room. The house with three rooms and one living room is 120 m² in total, and its plan is provided in Figure 5.23. All of the rooms are quite spacious as in the provided images of the example under construction. However, the problem of the absence of a separating wall in the entrance is present in this type of house plan.

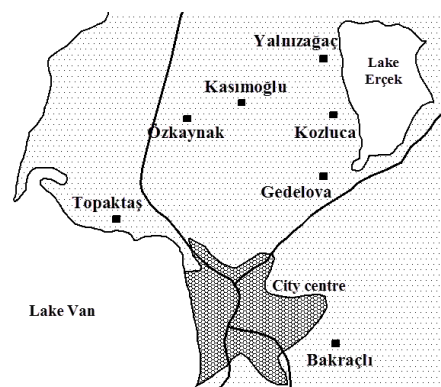


Figure 5.24 The abstract map shows the locations of the villages sampled in the case study of Van.

What is significant about the reconstruction of the RC structures was that most contractors had left the interior finishing incomplete or used materials of inferior quality. This inevitably caused residents to spend extra money to complete floor coverings throughout the house, and add cupboards in the kitchen and a shower and sinks in bathroom. One can interpret this situation as providing residents the opportunity of finishing the interior as they wished; however, among a low-income population, it is a challenge as most dwellers cannot afford these items. Thereby, many applied primitive techniques such as covering the concrete floors with several layers of carpet, using a flat, low-quality piece of marble as a kitchen counter, or leaving the bathroom without a shower or simply adding curtains with hangers.

The study

With this in mind, the seven sample villages studied were Topaktaş, Özkaynak, Bakraçlı, Gedelova, Kozluca, Kasimoğlu, and Yalnızagaç (Fig. 5.24). As a reminder, Topaktaş and Özkaynak are villages constructed by TOKI. The fieldwork was conducted between 25th and 28th August 2013. Eighty questionnaires and 21 semi-structured interviews were completed as most participants were easy-going and wished to talk about the issues that the current research investigates.

5.4 Review of the case studies

With the review of the case studies, the following findings, which also take into account the sample villages examined in the related appendix, outline an overview of the chapter before the introduction of the detailed analyses of the empirical data of the study.

Disaster preparedness

It can be seen that Turkey has attempted to improve the level of disaster preparedness throughout the earthquake experiences in terms of the capacity for emergency aid and the extent of rehabilitation areas (both the built environment and livelihoods). However, when an earthquake strikes in winter, it causes additional challenges regarding on-site action. For example, the tents provided for temporary shelter are not adequate for winter conditions. Another issue is that temporary dislocation of the people within and from the region carries the risk of turning into a permanent migration. Despite the fact, an approach of temporary migration was used in Van after the 2011 earthquakes.

Damage assessment

The experiences revealed that there is a lack of trained and experienced personnel to conduct crisis management during disasters, damage assessments after earthquakes, and on-site reconstruction. The lack of personnel causes delays, mistaken decisions, and unsatisfactory results in the assessment processes. Particularly the method conducted for damage assessment is quite inadequate as it is only based on visual assessment that merely considers the width of cracks and their location in structure unless the building is partially or totally collapsed. Besides, dialogues between house owners and surveyor may put pressure on the surveyor to record the building as severely damaged, or surveyor herself or himself may want to record so, to make eligible the family to receive a new house given the poor living condition of the family. This was the case often encountered by the researcher as well during the preliminary fieldwork.

Relocation of the settlements

Despite the theoretical perspective emphasises avoiding the relocation of settlements affected, as examples show, it was widely preferred by the authorities for the implementations in rural eastern Turkey. In some cases, relocation can be deemed an ill-considered decision because of the division of a village community into two parts, with one remaining in the existing settlement, and the other moving to the relocation site. It was also revealed that the main factor in determining the site of relocation is the vicinity to a main road or a lower altitude. Only few are relocated due to environmental inconveniences, e.g. liquefaction.

The agency-driven vs. owner-driven approach

The examples exhibited that the post-earthquake houses are mainly built by contractors had been hired by the authorities. In the most recent examples from Van, the villages were reconstructed under the control of AFAD and TOKI. As beneficiaries, the villagers were not involved in the construction of their houses, with the exception of a few cases that are elaborated in the next chapter. Nevertheless, this approach is called agency-driven in the literature, whilst in Turkey it has been promoted as owner-driven (i.e. EYY), indicating a misuse of the term. In addition, it was also found that communication between contractors and the beneficiaries is lacking since the beneficiaries did not know how their loan had been expended. This was another issue raised throughout the interviews and is also elaborated in the next chapter.

The choice of material and structural system

It is clear that the state made attempts to implement different structural types for permanent housing. This began with prefabricated wood panels in 1939 in Erzincan, and continued with light steel frame houses in 2012 in Van. After all, the projects were mostly built as RC frames and brick-infill walls, which became the dominant type of contemporary rural housing construction and replaced the traditional building character of villages in rural eastern Turkey. This issue was initially examined with an exploratory field study in Chapter 3 and with the examples in this chapter; the point of ‘transformation in the built environment’ is eventually addressed. It should also be noted that the shift from concrete to steel as the preferred structural material was apparently made without consulting the dwellers as some were dissatisfied with the system and others were not able to explain why the structure was preferred when building earthquake-resistant houses. In the most extreme cases, a few participants mentioned that this type of structure is undesirable as it does not allow them to add an extra floor.

The variety of house plans

The case studies revealed that early implementations offered only one typical house plan, as seen in the case study of Erzincan. For the villages of Erzurum, two different options were available according to the entitlement of beneficiaries. A single-storey building was constructed if the beneficiary was entitled to only a house, and a two-storey building was constructed if the beneficiary was entitled to both a house and a barn. In Van, beneficiaries were offered five house plan options. In this study, four were examined. This is clearly more preferable than adopting only one-type-house-plan considering the people’s different expectations and circumstances. Furthermore, beneficiaries in Van were given the opportunity to select a house with three rooms instead of two. However, owners had to pay an extra fee to the contractors for an additional room. It should be noted that providing such limited options is an attempt encourage the participation of rural villagers when constructing their environment, which is far better than deciding on their behalf. Nevertheless, residents in the villages of Topaktas and Ozkaynak did not have this opportunity as the contractor involved was required to implement only the plans agreed on by TOKI. As a special note, the house plan with a barn on the ground floor and a residence on the first floor was only used in Erzurum. All of the other implementations have separate barn units. Such a two-storey building plan is inappropriate for families who actively use their barn, as they made serious complaints (in the next chapter) and built a separate barn if they were able to afford.

The quality of material used and workmanship

Comparing the three case studies, it can be said that the permanent houses implemented in the villages of Erzurum are of the poorest quality in terms of the structural and finishing materials used and workmanship. Although it has been only a decade, which is far less than the 50-year average lifespan of concrete, the buildings constructed from this material have many cracks on the exterior walls, and fallen plaster on exterior stairs are widely observed. Such issues were not observed in the implementations in Erzincan despite the fact that the buildings are twenty-years old. Comparing the quality of finishing materials, it is clear that the permanent houses built under the control of TOKI are far better than the other implementations. In other words, the houses built as RC frame structures have suffered from inferior material quality and workmanship. Furthermore, the houses built by different contractors in Van were delivered with mostly incomplete finishing, which is clearly inappropriate considering the amount of the loan is allocated same to all of the beneficiaries.

The house loan model

Although the payment model developed for the house loan seems appropriate on paper; i.e., the idea of extending instalments up to 20 years with no interest may seem to be adopted for the benefit of low-income beneficiaries, in a real-life context, it was found that the model is not suitable for all beneficiaries. Firstly, given the most residents' irregular income, dependent primarily on animal husbandry, paying each month a loan instalment is often not possible. To sum up the case studies, in Erzincan, only half of the participants had repaid their loan; in Erzurum, none of the participants had ever made a payment and thus the state had excused half of the loan to make the amount affordable for the beneficiaries. In Van, the period of moratorium is still in effect, but based on the observations, the beneficiaries are very unlikely to make payments. Further discussion is made in the conclusion chapter regarding this issue.

Chapter 6

Results of analyses and key findings

This chapter brings empirical quantitative and qualitative data into light by presenting and discussing the results of statistical analyses of the questionnaires, and by quoting from the semi-structured interviews with rural dwellers. The aim is to discover how the evaluations of dwellers are shaped and changed, and what issues are crucial in the practice of post-disaster housing reconstruction and recovery for rural people. The statistical results are presented in the order of Van, Erzurum and Erzincan, and the highlights from the interviews are made through the themes selected. The chapter concludes with an overall discussion.

6.1 Preparation to analyses

Questionnaire design was one of the key steps in the methodology since it was chosen as the primary tool to collect the structured data for the study. Not differently, a more structured approach is needed since the data will be processed through various statistical models; and from there, inferences will be made to draw conclusions explaining how the relations between themes and variables studied work in the real-life context. Necessarily, a set of initial processes is followed to prepare the data for analysing. This includes coding variables, testing the internal consistency of the scale and selecting appropriate statistical models according to the type of data to run analyses resulting with accuracy.

Firstly, coding variables is the process of labelling verbal data with numbers in order to numerically define them in SPSS. This conversion process forms categorical, nominal and interval variables to be analysed. Secondly, the internal consistency was sought on the Likert-scale items through the Cronbach Alpha's coefficient reliability test. The coefficient resulted was as high as 0.85; and more importantly, none of the items in the scale affected the consistency dramatically as the coefficients listed under 'Cronbach's Alpha if item deleted' ranged only between 0.84 and 0.86 (p: 345). These results suggest that the items can be used as data since they carry a reasonable degree of reliability.

The final step was to decide the types of statistical models to be utilised with regard to the type of data. As explained also in Chapter 4, the analyses are divided into two categories. The first one is the descriptive analysis to tabulate the distributions of the responses given to items examined. The demographic characteristics of the participants and their overall evaluation results are presented under this category. The analyses in the second category aim to explore advanced linkages between the items and variables; hence they are called ‘inferential statistics’. *Correlation coefficient* was utilised to explore the extent of the relevancy between two variables. *One-way ANOVA between-groups*, with Tukey HSD post-hoc test, and *independent-samples T-test* were utilised to explore the mean value differences between the groups under the variables examined. *Cross-tabulation* was utilised to demonstrate the distributions. Since none of these analyses establish causality or corrects a relationship found between two variables with a factor of third variable³⁶, the researcher drew such conclusions based on her fieldwork observations and the highlighted issues during the interviews. Accordingly, the interviews are extensively examined and quotations developing an understanding on the issues of migration, livelihood, reconstruction process and post-occupancy evaluations are critically composed as the qualitative data analyses. Having said, the interviews were not analysed with any specific software. Rather, the themes were simply selected based on the study focus and the quotations fitting to the themes were placed from all of the interviews as far as possible. As the interviews were originally in Turkish, they were translated into English verbatim as much as possible in order to keep the true meaning and to give the feeling of the interviewees’ reflections on their words. All of the interviewees are referred by enumerations: from 1 to 21, Van, from 22 to 34, Erzurum, and 35, Erzincan³⁷.

6.2 Case study analyses and results

The analyses are displayed in the order of Van, Erzurum and Erzincan, which is reverse in Chapter 5. The aim at doing so is to better portray the changes occurred in the socio-economic patterns as well as in the perceptions and preferences at the individual scale in time. It is expected to understand the role of time and the long-term changes that the earthquakes had introduced to the communities so that the argument of adaptation can be addressed in the case of rural eastern earthquake-affected communities in Turkey. Basically, the results of Erzincan and Van significantly differed from each other’s in terms of socio-economic indicators. In Erzincan the participants are more aged and with less number of households, in better

³⁶ There are advanced statistical models doing this, but not preferred in this study. See p: 112.

³⁷ For the details of the interview recordings, see Appendix II.

economic status with many holding a type of social insurance and largely have non-agricultural livelihood. In contrast, the participants in Van are more of young population, large number of households, mainly have agricultural-dependent livelihood, and mostly have no social insurance. These differences can be interpreted as the time effect on people that have made them to change their attitudes, perspectives and characteristics as a result of adaptation in two decades. The participants in Erzurum display a trend in the middle of this adaptation period. To say, three case studies effectively capture the different stages of adaptation that stressed in the theoretical discussion in Chapter 2 and addressed the goal of evaluation explained in Chapter 4.

6.2.1 The case study of Van

In total, 80 questionnaires are collected from seven villages, and the results of the descriptive and inferential analyses are outlined in the following part.

6.2.1.1 Descriptive analyses

The demographic characteristics of 80 participants and the results of six evaluation questions are tabulated through frequencies in order to show the general tendency of the participants regarding the post-earthquake housing implementations.

6.2.1.1.1 Demographic characteristics of the samples

The number of households varied from 1 to 14 across 80 participants. In average, 5 households per house is the most common case as it was reported 14 times; 4 and 7 households are the following most common cases as they were reported 12 times. The total distribution of the number of households for 80 participants is given in Table 6.1.

Table 6.1 The distribution of the number of households in Van.

No. of household	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
Frequency	1	4	6	12	14	9	12	5	7	6	1	1	0	2	80
%	1,3	5,0	7,5	15,0	17,5	11,3	15,0	6,3	8,8	7,5	1,3	1,3	0	2,5	100

Having no children was the case seen 6 times in 80. Having 9 children was an exception to one case. In general, 2, 3 and 4 children were respectively the most common case as each was reported at least 10 times. Having one child was also quite common as it was seen in 10 cases as well (Table 6.2).

Table 6.2 The distribution of the number of children in Van.

No. of children	0	1	2	3	4	5	6	7	8	9	Total
Frequency	6	10	14	12	11	9	9	5	3	1	80
%	7,5	12,5	17,5	15,0	13,8	11,3	11,3	6,3	3,8	1,3	100

The age ranges of 18-34 and 35-49 nearly made 75% of 80 participants, which implies that Van has relatively younger population than that in Erzurum and Erzincan. Only four participants were older than 65. Two participants were not reported (Table 6.3).

Table 6.3 The distribution of the age groups in Van (*m.d: missing data).

Age groups	18-34	35-49	50-65	65+	m.d*	Total
Frequency	29	29	16	4	2	80
%	36,3	36,3	20,0	5,0	2,5	100

The education level of the participants was higher than expected considering the regional demographic characteristics. Only 8 of 80 had no education, while 18 were at university level or graduated from. The shares of the primary and high school education were equal and the highest (Table 6.4).

Table 6.4 The distribution of the education levels in Van.

Education level	none	primary	secondary	high school	university	m.d	Total
Frequency	8	21	11	21	18	1	80
%	10	26,3	13,9	26,6	22,8	-	100

Although only less than two years passed after the earthquake and the delivery of the houses by the time of the fieldwork conducted, few houses had already been left to the relatives by the actual owners as they were no longer living in the villages. 13 participants were occupier as kin, and 66 were the owners. Only one participant was a non-kin tenant (Table 6.5).

Table 6.5 The distribution of the occupant types in Van.

Householder type	Owner	Tenant	Kin-rent paying	Kin-not paying	Total
Frequency	66	1	2	11	80
%	82,5	1,3	2,5	13,8	100

To explore the post-earthquake experiences of the participants, they were questioned about the duration of their stay in temporary shelters and migration. The output of two data were compatible as the number of the participants who stayed in tents and containers for less than one year was 33 and the number of the participants migrated was 34. In other way, the number of the participants who stayed in temporary shelters for more than one year, until they resettled in their new houses, was 45 as the number of the participants not-migrated was 46 (Table 6.6).

Table 6.6 The distribution of the length of temporary shelter stay and the distribution of migration status in Van.

Temporary shelter stay (months)	0-6	7-12	12+	N.A	Total
Frequency	11	22	45	2	80
%	13,8	27,5	56,2	2,5	100

Migration	Yes	No /N.A	Total
Frequency	34	46	80
%	42,5	57,5	100

In an attempt to understand the extent of the damage in the built environment, the participants were asked the damage level of their former houses. Nearly half of 80 participants' former houses collapsed in the earthquake. The remaining 29 stated their former houses suffered heavy damage and 13 participants' houses suffered moderate damage. One participant was not able to comment since they were a tenant came from another village (Table 6.7).

Table 6.7 The distribution of the house damage in Van.

Condition of previous house	Damaged	Heavily damaged	Collapsed	N.A	Total
Frequency	13	29	37	1	80
%	16,3	36,3	46,3	1,3	100

The relocation status of the dwellings was also questioned. Conditionally, if a house was not rebuilt in the place of the former building or at its nearby, it was considered relocated, which was the case in most villages which were not relocated entirely. The majority of the houses were checked as relocated (Table 6.8).

Table 6.8 The distribution of the relocation status of the houses in Van.

Settlement type	Relocated	Not relocated	Total
Frequency	53	27	80
%	66,2	33,8	100

The participants were also questioned about the duration of their permanent residency in their new houses. At the time of the fieldwork, it was less than one year for the majority. Hence, there were dwellers resettled just two or three months ago as well as nine months ago. As a footnote, the participants with more than one year permanent residency were from the villages of Topaktas and Ozkaynak, which were rebuilt under the control of TOKI. Seven participants were not dwellers yet as their houses were in the late stage of the construction by the time of the fieldwork, though they contributed to the rest of the survey (Table 6.9).

Table 6.9 The distribution of dwellers' permeant occupancy in permanent houses in Van.

Duration of occupancy (years)	0-1	1-5	N.A	Total
Frequency	54	19	7	80
%	67,5	23,8	8,8	100

6.2.1.1.2 General evaluation of reconstruction-related issues

The following six evaluation questions worked as control questions in the questionnaire, which means the pairs of questions sought similar responds by asking from the other way around. For example, the questions 11 and 15 sought for the overall satisfaction of the dwellers with their houses and their earlier expectations of their houses. The results showed that the majority was strongly satisfied with their houses. However, the mean values in Table 6.10 imply that the dwellers' expectations have been met to some extent, which actually left them less satisfied as it clearly decreased to 4.23 from 4.50.

Table 6.10 The distribution of the scores for the questions 11 (How much are you satisfied with your current house?) and 15 (In what level were your expectations satisfied in your current house?).

5-point Likert scale	1 Strongly disagree	2 Disagree	3 Ambivalent	4 Agree	5 Strongly agree	N.A	Total	Mean value
Q11	0	3	6	9	60	2	80	4.50/5.00
%	0	3,8	7,5	11,2	75,0	2,5	100	
Q15	1	2	5	11	54	7	80	4.23/5.00
%	1,2	2,5	6,2	13,8	67,5	8,8	100	

The questions of 16 and 60 had the same purpose as they asked how much the dwellers had the wish to stay or to leave their houses. This pair of questions displayed purely compatible results with regard to the frequency distributions. That is, as shown in Table 6.11, 83.8% were 'strongly agree' as they had a strong wish to stay; whereas, it was only 17.3% who strongly agreed in terms of the tendency they had for leaving their houses in future. Accordingly, the mean values were high as 4.45 for 16 and low as 1.96 for 60.

Table 6.11 The distribution of the scores for the questions of 16 (How much do you wish to live in this house for the rest of your life?), and 60 (You may consider leaving your current house in future).

5-point Likert scale	1 Strongly disagree	2 Disagree	3 Ambivalent	4 Agree	5 Strongly agree	N.A	Total	Mean value
Q16	2	2	1	3	67	5	80	4.45/5.00
%	2,5	2,5	1,2	3,8	83,8	6,2	100	
Q60	47	3	6	4	14	6	80	1.96/5.00
%	58,8	3,7	7,5	5,0	17,5	7,5	100	

Finally, the participants were asked to rank for the statements 58 and 59 in order to uncover their thoughts about their current living standards and longing for the former built environment. The results were challenging for this pair of statements, as presented in Table 6.12. To say, the responds for the statement 58 concentrated more on ‘strongly agreed’ as the mean value was 4.06. However, the responds for the statement 59 were shared between ‘strongly agreed’ and ‘strongly disagreed’. Thus, the mean value gave the result 2.59, which suggested that the rural community was ambivalent at feeling longing to their former houses and settlements.

Table 6.12 The distribution of the scores for the statement 58 (Your current living standard is better than the earlier), and 59 (You miss your former house and settlement).

5-point Likert scale	1 Strongly disagree	2 Disagree	3 Ambivalent	4 Agree	5 Strongly agree	N.A	Total	Mean value
Q 58	1	5	7	7	53	7	80	4.06/5.00
%	1,3	6,3	8,8	8,8	66,3	8,8	100	
Q 59	33	4	5	4	27	7	80	2.59/5.00
%	41,3	5,0	6,3	5,0	33,8	8,8	100	

These relatively high satisfaction scores can be given to the period, during which the dwellers were homeless and had to live in unusual circumstances. Thus, with the completion of the houses, they were able to turn back to their normality. Besides, some were living in severely poor physical conditions before the earthquakes and with this opportunity, as to the words of some of the interviewees; they became owner of a properly built house. Further issues and discussion are highlighted with the following inferential analyses.

6.2.1.2 Inferential analyses

The following statistical analyses investigated likelihood relationships between a number of socio-economic and physical environment indicators and overall evaluations.

6.2.1.2.1 Effect of the physical features of the house

Correlation is utilised to measure the relations between the physical features of the house, the overall satisfaction with the house, the level of expectations met and the tendency to live in the house. Based on the correlations found between 11, 15 and 16, it can be concluded that the relation of wishing to live in the house with the level of expectations met is much stronger ($r=.793$) than that with the overall satisfaction with the house ($r=.604$). The correlation between the level of expectations met and the overall satisfaction with the house was, however, $r=.563$. Nevertheless, the three items have statistically significant positive large correlations with each

other which mean a change in one of the items strongly affects the others in the same way. To interpret the results in real-life context, the relation found between 15 and 16 suggests that meeting expectations means much more for dwellers in terms of developing sense of ownership than being satisfied with the house to some extent. Moreover, the relation between 11 and 15 may also indicate that despite the dwellers feel satisfied with their houses in general this does not necessarily mean their expectations are met at the same level, which was also pointed through the frequency distributions previously.

With regard to the features of the house, except the variable of heating and ventilating during winter season, all of the variables from 22 to 28 given in the questionnaire resulted with statistically significant positive medium correlations (the minimum $r=.323$, the maximum $r=.506$) with the evaluation items of 11, 15 and 16. In detail, it is particularly worth to emphasise that the size of house and rooms and the quality of the finishing interior materials displayed a bit smaller correlations with the item 15, which can be linked to fact that the level of expectations met regarding these features of the houses was lower indeed. Even though, it did not affect the overall satisfaction, 11, and the wish to live in the houses, 16, in the same degree. Similarly, the variable of easy cleaning resulted with higher correlation with the item 15 ($r=.495$) than that with the 11 ($r=.323$), which can be linked to the fact that the easiness of cleaning and maintaining the interior house had highly satisfied the dwellers in terms of meeting their expectations. In the end, the correlation results indicate that the variables chosen to examine the residential units are accurate to the context of the study as they are crucial for the rural dwellers when they evaluate the post-earthquake implementations.

6.2.1.2.2 Effect of the size of household and children

The effect of the size of households and children is examined through correlation to explore the relations with the items 11, 15 and 16, and the variable 22. The average size was estimated 6 for households and 4 for children. The only result worth to mention is that the number of households displayed statistically highly significant negative medium correlation ($r=-.353$) with the variable 22. In real-life context this means the higher the number of the households the less satisfied the dwellers are with the size of the house and rooms, which is not unexpected.

The number of children also resulted in negative medium correlation ($r=-.306$) with the variable 22. However, the correlation found indicated that the number of children does not have a 'linear' relation with the evaluation of the size of the house and rooms, unlike the size

of the household; rather, it has a ‘*monotonic*’ relation with the variable. In real-life context, the number of children does not straightforwardly affect the evaluation of the size of the house and rooms, whereas the number of the households certainly does.

6.2.1.2.3 Effect of relocation

Relocation is examined to understand the possible effect on the evaluation of the housing projects in the perspective of dwellers. The dwellers relocated (53) and not-relocated (27) were set as different groups. An independent sample t-test was operated to compare the mean values of the given items (Table 6.13). Firstly, the relocated dwellers resulted in higher score (M=4.60) than the not-relocated dwellers (M=4.30) in terms of their overall satisfaction with the houses. However, secondly, in terms of comparing their post-earthquake and pre-earthquake houses, not-relocated dwellers ranked higher satisfaction score (M=4.70) than that of the relocated group (M=4.45). Thirdly, the level of expectations met regarding the house was also higher for the not-relocated (M=4.38) than the relocated (M=4.15). Fourthly, the wish to live in the post-earthquake houses was higher for the relocated group (M=4.53) than the not-relocated group (M=4.30). For the statement given in the item 59, despite the mean values are still in the range of disagree, the score of the relocated group almost reached to the ambivalent (M=2.98) as it was quite higher than that of the not-relocated group (M=1.81). Similarly, the statement regarding the tendency to leave the post-earthquake house in future was scored higher by the relocated group as well (M=2.57). Regarding the results, it can be preliminarily concluded that the dwellers not-relocated are happier with their post-earthquake houses.

Table 6.13 The mean scores and standard deviation of two relocation groups in Van.

	Groups	N	Mean value	S.D.
Q11 How much are satisfied with your current house?	Not relocated	27	4.30	1.463
	Relocated	53	4.60	.793
Q12 Do you find your current house better than the one you had previously?	Not relocated	27	4.70	1.031
	Relocated	53	4.45	1.066
Q15 In what level were your expectations satisfied in your current house?	Not relocated	27	4.38	1.627
	Relocated	53	4.15	1.392
Q16 How much do you wish to live in this house for the rest of your life?	Not relocated	27	4.30	1.728
	Relocated	53	4.53	1.234
Q58 Your current living standard is better than the earlier.	Not relocated	27	4.15	1.812
	Relocated	53	4.02	1.487
Q59 You miss your former house and settlement.	Not relocated	27	1.81	1.642
	Relocated	53	2.98	1.976
Q60 You may consider leaving your current house in future.	Not relocated	27	1.56	1.423
	Relocated	53	2.57	1.751

Only the item 59 resulted with statistically significant difference between the relocated and not-relocated groups. The eta square (Cohen's d) is calculated .06, which is deemed a very small effect size. To verify the statistically significant difference and effects size, the item 59 was re-tested through one-way ANOVA between groups. The significant difference between the groups was verified at the same value ($p=.007$), though the effect size remained very small ($d=.08$). Thus, it can be concluded that the difference between the groups when they evaluated the statement 59 is 'unlikely to occur by a chance' across the target population.

Through correlation analysis it is discovered how strongly correlated the item 59 and 60 with each other. The positive medium correlation ($r=.332$) between 59 and 60 suggests that the higher the dwellers' longing for their former house and settlement, the more they tend to leave their houses, which also addresses the differences at the mean values between the relocated and not-relocated groups.

6.2.1.2.4 Effect of the demographic characteristics

Demographic characteristics are examined with a focus on the participants' age and type of livelihood. To explore the relation of different age groups with the wish to stay and the tendency to leave, one-way ANOVA between groups test is conducted. However, there is simply no significant difference between the mean values of the age groups for the given statement in 16.

In contrast, for the item 60, there is a significant difference between the mean values of the age groups. The significant difference is particular to the age groups of 18-34 and 35-49 as the post-hoc Tukey HSD test revealed. The tendency to leave the house in future is the highest for the age group of 18-34 as their mean value is 2.83. The result is also approved through the non-parametric version; Kruskal-Wallis test calculated the mean rank as the highest of all groups (49.52). The effect size of the statistical difference is calculated .015, considered as large based on Cohen's d classification.

Differences between the three livelihood groups and the items 58, 59 and 60 are sought also through one-way ANOVA between-groups with Tukey HSD post-hoc tests. The results highlighted the difference between the groups of agriculture and urban labour for the item 60. It is noteworthy to mention that the urban labour group has the lowest satisfaction with their living standards ($M=3.68$) in comparison with the other/retired ($M=4.46$) and agriculture ($M=4.17$) groups. Despite the fact, there is no statistically significant difference between the

groups. No such particular results yielded for the item 59. However, like the age groups, the difference between the mean values of the agriculture and urban labour group is found statistically significant for the item 60, 1.45 and 2.72 respectively. That means the dwellers doing agricultural activities to sustain livelihood had the lowest tendency to leave their post-earthquake houses, unlike the dwellers who work in the urban area of Van. The effect size calculated for this difference is 0.12, which is deemed large according to Cohen's d classification.

The differences between the livelihoods are also examined on the item 69, which asked the dwellers to relate the quality of the houses and the amount of the loan. The results of one-way ANOVA test yielded no statistically significant difference between three groups. However, when the cross-tabulation is displayed for each group (Table 6.14) the difference between the agriculture and urban labour becomes clear. The majority of the agriculture group (19 of 42) ranked 'strongly agreed', which means they find the houses worth to the loan. Contrarily, the participants of the urban labour groups ranked 'ambivalent' in the first place (7 of 25) and 'disagreed' in the second place (6 of 25), which imply that they mostly find the houses low-quality, thus not worth to the loan. Despite the fact that the statistical results do not yield a particular difference, it is not wrong to draw the conclusion that there is difference to some extent between two groups and their perspectives.

Table 6.14 Cross-tabulation of livelihood groups and worthiness of the houses in Van.

	Ranking	Agriculture	Urban labour	Other/retired	Total
Q69	0 N.A	8	2	2	12
	1 Strongly disagreed	2	4	3	9
	2 Disagreed	4	6	2	12
	3 Ambivalent	6	7	2	15
	4 Agreed	3	4	2	9
	5 Strongly agreed	19	2	2	23
Total		42	25	13	80

To elaborate this conclusion, the variable 25, the quality of finishing interior materials used for the houses, is analysed through one-way ANOVA and cross-tabulation to seek the relation with different livelihood groups. No significant difference was found and the distributions of the ranks are rather homogenous and in similar pattern considering the number of participants in each group (Table 6.15). It should be highlighted that the mean value of urban labour groups is lower ($M=2.68$) than that of the agriculture group ($M=3.02$) and the average of all ($M=2.89$). The cross-tabulation indicates that the dwellers are mostly not satisfied with the quality of interior materials.

Table 6.15 Cross-tabulation of livelihood groups and the quality of interior finishing materials used in Van.

	Ranking	Agriculture	Urban labour	Other/retired	Total
Q25	0 N.A	4	1	0	5
	1 Strongly disagreed	1	3	2	6
	2 Disagreed	4	6	3	13
	3 Ambivalent	20	9	4	33
	4 Agreed	7	5	3	15
	5 Strongly agreed	6	1	1	8
Total		42	25	13	80

Based on the highlights from the analyses of 25 and 69, a likely relation between them is sought through correlation, which expectedly discovered a small positive correlation ($r = .225$). However, the relation was not 'linear'; it was 'monotonic' as to the result of Spearman's rho. In real-life context, this means in assessing the worthiness of the houses to the loans, the quality of the interior finishing material is an effective indicator according to the dwellers, but not to a large extent and not in the first place.

Because of rural characteristics of the region, post-earthquake housing implementations include barn units nearby the houses. However, it was observed during the fieldwork that some of the barns were not in use since the householders no longer continue agricultural activities, which is one of the issues captured in the interviews. In this regard, a cross-tabulation (Table 6.16) simply reveals that the barn units are mostly used by the agriculture group, and nearly never used by the remaining. There are a number of participants under the agriculture group, who use their barns neither for livestock nor for farming stock, but for other purposes. Thus they were entered as 'not available' to provide an accurate evaluation indicating the proper use of barns. The remaining in agriculture group mainly ranked 'ambivalent' and above, which imply they are moderately happy with the size and the location of their barns.

Table 6.16 Cross-tabulation of livelihood groups and the use of barns in Van.

	Ranking	Agriculture	Urban labour	Other/retired	Total
Q36	0 N.A	17	21	13	51
	1 Strongly disagreed	1	0	0	1
	2 Disagreed	1	0	0	1
	3 Ambivalent	11	2	0	13
	4 Agreed	4	0	0	4
	5 Strongly agreed	8	2	0	10
Total		42	25	13	80

6.2.1.2.5 General relations between selected factors

Like the strong correlation previously found between the items 15 and 16 with the item 11, the item 12 has also large correlation with 11 ($r = .590$). It questioned the dwellers' opinions in terms of comparing their current houses with their former houses. A steady relation was

anticipated with the items 15 and 16 as well. Expectedly, a relatively strong positive correlation is found with 16 ($r = .659$), which can be interpreted as the more they find better their post-earthquake houses than the pre-earthquake, the more they have the tendency of keep living in their post-earthquake houses. The strength of the statistical significance of this correlation implies that this relation is linear and very unlikely to occur by chance across the population.

The relation found between 12 and 15 ($r = .613$) is not any different than this, which suggests that the level of expectations met and the level of finding better the house are the variables strongly correlated with each other. However, the dwellers' opinions in finding better their current houses and living standards estimated far less correlated with the size of the house and rooms ($r = .358$).

Another pair of items, 12 and 58, about evaluation of the conditions of the house and the living standards of the dwellers, are found correlated to each other ($r = .341$). Similarly, the level of expectations met is also found highly correlated with the variable of finding better the living standards in the post-earthquake houses ($r = .530$).

It was explored that the overall satisfaction with the house and with living standards, the level of expectations met and having the wish to live in the house are the variables not only strongly and positively correlated with each other, but also statistically approved that they are likely to occur by no chance in the target population. In real-life context, these relationships indicate that they altogether shape the dwellers' decisions regarding their house and the location they live.

A final correlation analysis was run to discover how related the items 11, 13, 44, 45 and 60 to each other. There is a strong positive and significant correlation ($r = .572$) between the preference of the structural system of the houses and the dwellers' high overall satisfaction. Furthermore this correlation is significant within the target population. In real-life context, this can be interpreted as the type of the structural system built played a significant role in the dwellers' overall evaluation.

However, the lack of correlation ($r = .03$, $n = 79$, $p > .05$) between the items 13 and 44 along with the insignificant small correlation ($r = .16$, $n = 79$, $p > .05$) between the items 11 and 44 imply that being satisfied with the house or preferring the structural system of the house are not indicators affecting dwellers in terms of making them feel safer against earthquakes. Having said that, the correlation found ($r = .621$, $n = 79$, $p < .05$) between 44 and 45 explain how the disaster deeply traumatised the dwellers psychological conditions that they feel safer as much as they are

afraid of earthquakes. Despite the small negative correlation between 44 and 60, which is also statistically significant ($r = -.268$), the result suggests that the safer the dwellers feel, the less they consider leaving their houses in an attempt to build another one.

With a concluding special focus on the choice of construction material, which is particular to Van, the same items above were analysed based on the material groups of steel and reinforced concrete by conducting independent samples t-test. Based on the mean values of two groups, the differences are statistically significant only for the items 13 and 60, which address the issues of preferring the structural system and the tendency of considering leaving the house in future. The cross-tabulation is also studied to explore how the ranks were yielded for each item. It can be said that steel is less preferred among the dwellers, while concrete is strongly preferred. Given the largest mean value difference (0.95) between two groups, the dwellers of light-steel frame houses mentioned their tendency of leaving their houses more frequently, while the dwellers of reinforced concrete frame houses hardly did so.

Although no significant difference appeared, it is observed that the light-steel frame houses are found less valued than the amount of the loans according to the dwellers. In terms of relying on the seismic-resistance of the houses and the overall satisfaction with the houses, the ranks have been distributed in the quite same pattern for both construction material groups.

6.2.2 The case study of Erzurum

The data was collected from five villages. The collection of 80 questionnaires is used to generate the following descriptive and inferential analyses.

6.2.2.1 Descriptive analyses

The following frequency tables show that the age range of 80 participants in Erzurum and their migration status in the aftermath of the earthquake differed from the case study of Van. The satisfaction scores of the evaluation questions generally yielded similar results with Van.

6.2.2.1.1 Demographic characteristics of the samples

The number of households varied from 1 to 11, and the most common cases were 5, 6 and 7 households as each was recorded for at least 15 houses. The largest household was only seen in two cases, whereas the participants living alone were 4. The distribution of all cases is given Table 6.17, of which the average number of households is estimated 5.

Table 6.17 The distribution of the number of households in Erzurum.

No. of household	1	2	3	4	5	6	7	8	9	10	11	Total
Frequency	4	5	6	8	16	17	15	5	1	1	2	80
%	5,0	6,3	7,5	10,0	20,0	21,3	18,8	6,3	1,3	1,3	2,5	100

The number of the houses with no children was 12. The most widely observed case was 4 children. It was followed with 3 and 2 children as they were reported for 18 and 15 cases, respectively. The average number of children was estimated 3 per house as to the distribution given in Table 6.18.

Table 6.18 The distribution of the number of children in Erzurum.

No. of children	0	1	2	3	4	5	6	7	Total
Frequency	12	5	15	18	21	5	3	1	80
%	15,0	6,3	8,8	22,5	26,3	6,3	3,8	1,3	100

The distribution in Table 6.19 clearly shows that the participants in Erzurum are generally older than the participants in Van. There were 4 participants older than 65 in Van; the number is 13 in Erzurum. The number of the participants in range of 50-65 was 16, but it is 21 in Erzurum. The youngest age group, 18-34, has 9 participants; while it was 29 in Van.

Table 6.19 The distribution of the age groups in Erzurum (*m.d: missing data).

Age groups	18-34	35-49	50-65	65+	m.d*	Total
Frequency	9	36	21	13	1	80
%	11,3	45,0	26,3	16,3	1,3	100

In terms of education levels of the participants, high-school education comes in the first place, and primary and secondary schools follow respectively (Table 6.20). The number of participants with university-level education is 12. Only 3 participants were with no education.

Table 6.20 The distribution of the education levels in Erzurum.

Education level	none	primary	secondary	high school	university	m.d	Total
Frequency	3	19	15	27	12	4	80
%	3,8	23,8	18,8	33,8	15,0	5,0	100

Migration was not a popular decision in Erzurum following the earthquake, in contrast to Van. Indeed, the majority of the participants, 77 of 80, accommodated only in their temporary shelter until they resettled in their new houses. One participant did not commend since they were an outsider in the village, and two stated that they could not recall. The frequency tables for migration and temporary shelters are given in Table 6.21 and Table 6.22.

Table 6.21 The distribution of the length of temporary shelter stay in Erzurum.

Temporary shelter stay (months)	0-6	7-12	Do not remember	N.A	Total
Frequency	31	46	2	1	80
%	38,8	57,5	2,5	1,3	100

Table 6.22 The distribution of the migration status of the participants in Erzurum.

Migration	Yes	No /N.A	Total
Frequency	0	80	80
%	0	100	100

Reconstruction in relocation site was widely applied by the state in Erzurum as well since 60 of 80 participants' houses were reconstructed in a different place than their original locations (Table 6.23). The distributions in Table 6.24 show that more than half of the participants' former houses had collapsed and the majority of the second half had suffered heavy damage. This shows that the area chosen for the study was highly affected by the 2004 disaster. Only one participant's house suffered moderate damage.

Table 6.23 The distribution of the relocation status of the houses in Erzurum.

Settlement type	Relocated	Not relocated	Total
Frequency	60	20	80
%	75,0	25,0	100

Table 6.24 The distribution of the house damage in Erzurum.

Condition of previous house	Damaged	Heavily damaged	Collapsed	Total
Frequency	1	37	42	80
%	1,3	46,3	52,5	100

The vast majority of the participants were residents in their post-earthquake permanent house for ten years, since when the houses were delivered. Only 5 occupants were residents for less than 5 years as one of them was tenant (outside the village) and three were relatives of the beneficiary householders rented their houses to. Only one participant was a dweller who had bought the house from the beneficiary householder. In this context, the distributions given in Table 6.25 and Table 6.26 are compatible with each other.

Table 6.25 The distribution of the occupant types in Erzurum.

Householder type	Owner	Tenant	Kin-rent paying	Kin-not paying	Total
Frequency	76	1	1	2	80
%	95,0	1,3	1,3	2,5	100

Table 6.26 The distribution of the dwellers' permeant occupancy in permanent houses in Erzurum.

Duration of occupancy (years)	0-1	1-5	6-10	Total
Frequency	1	4	75	80
%	1,3	5,0	93,8	100

6.2.2.1.2 General evaluation of reconstruction-related issues

Compared to Van, the participants in Erzurum portrayed a little more overall satisfaction with their houses as to the mean value of the item 11. When they were asked how much they were satisfied considering their expectations regarding the house, they also portrayed higher satisfaction than the participants in Van. The mean value of 15 is 4.91, while it was 4.23 for Van (Table 6.27).

Table 6.27 The distribution of the scores for the questions 11 (How much are you satisfied with your current house?), and 15 (In what level were your expectations satisfied in your current house?).

5-point Likert scale	1 Strongly disagree	2 Disagree	3 Ambivalent	4 Agree	5 Strongly agree	N.A	Total	Mean value
Q11	1	2	5	11	61	0	80	4.61/5.00
%	1,3	2,5	6,3	13,8	76,3	0	100	
Q15	1	0	1	1	77	0	80	4.91/5.00
%	1,3	0	1,3	1,3	96,3	0	100	

When the participants were asked the probability of leaving their current post-earthquake houses, their responses yielded in the similar pattern with the participants of Van: 52 participants strongly disagreed to the statement given in the item 60, which imply that they never consider leaving their houses for any reason (Table 6.28). More participants in Erzurum than in Van expressed their wish to live in their current houses, which eventually result with the mean value 4.95.

Table 6.28 The distribution for the question 16 (How much do you wish to live in this house for the rest of your life?), and 60 (You may consider leaving your current house in future).

5-point Likert scale	1 Strongly disagree	2 Disagree	3 Ambivalent	4 Agree	5 Strongly agree	N.A	Total	Mean value
Q16	0	0	1	2	77	0	80	4.95/5.00
%	0	0	1,3	2,5	96,3	0	100	
Q60	52	6	7	0	14	1	80	1.94/5.00
%	65,0	7,5	8,8	0	17,5	1,3	100	

With regard to the statement given in the item 58, 67 of 80 participants strongly agreed to that they found their living standards better than what it was before the earthquake. The number was 53 for Van. The mean value is naturally higher than that of Van, which is 4.66. The

distributions given in Table 6.29 also suggested that the participants in Erzurum had a bit more longing to their former houses and settlements, the item 59.

Table 6.29 The distributions for the statement 58 (Your current living standard is better than the earlier), and 59 (You miss your former house and settlement).

5-point Likert scale	1 Strongly disagree	2 Disagree	3 Ambivalent	4 Agree	5 Strongly agree	N.A	Total	Mean value
Q 58	0	2	10	1	67	0	80	
%	0	2,5	12,5	1,3	83,8	0	100	4.66/5.00
Q 59	34	10	10	5	21	0	80	
%	42,5	12,5	12,5	6,3	26,3	0	100	2.61/5.00

By looking at the preliminary results of the descriptive analyses, it can be concluded that the dwellers in Erzurum are more satisfied with their houses and the implementations in general. However, the following inferential analyses will uncover further understandings that underpin the contrary views encountered during the interviews.

6.2.2.2 Inferential analyses

All of the inferential analyses were ordered in the same structure with the case study of Van in an attempt to make easier to detect the differences and similarities between two cases, unless further complicated issues emerged among the results.

6.2.2.2.1 Effect of the physical features of the house

The inferential analyses are started with correlation. Each item from 22 to 29, about physical features of the houses, is paired with the items 11, 15 and 16, the fundamental evaluations questions. The strong relation found between the items 15 and 16 for Van, the level of expectations met and the wish to live in the house for the lifetime, occurred in the same statistical strength, which is a large positive significant correlation ($r=.795$). The correlation between 11 and 15, the overall satisfaction and the level of expectations met, is positive medium and statistically significant ($r=.435$). The same correlation was large in the case study of Van. Similarly, the correlation between 11 and 16, the overall satisfaction with the house and the wish to live in the house for the lifetime, is medium ($r=.482$); whereas it was large ($r=.604$) in the case study of Van.

In the real-life context, the relations found can be interpreted in the same way done in the case study of Van. Here, the mean values should be mentioned since they are higher than that of Van. Particularly, the items 15 and 16 have 4.91 and 4.95 scores respectively, which are not

only the highest scores in the study, but also very close to each other. This explains the large correlation between them. By looking at the mean values of the items 11 and 16, it can be understood why these two resulted in lower correlation values than that occurred in the case study Van. The scores were closer for two, which were respectively 4.50 and 4.45; however, in the case of Erzurum, the scores are 4.61 and 4.95, which eventually resulted with lower correlation. Nevertheless, the correlations still can be understood in the way explained for Van.

In terms of assessing the physical features of the houses, both the mean values and the correlations differed from what found in the case study of Van. To begin with the evaluation of the size of house and rooms, the mean value scored 3.75, which is lower than the scored in the case study of Van. This low score can be associated with the two-storey houses that are widely found inappropriate by the participants due to having barn in ground floor. The variable had statistically significant correlations with the items 11, 15 and 16 in the case study of Van; for the case of Erzurum the only statistically significant correlation exists with the item 11 ($r = .249$), and the strength of the relation is small. A small correlation ($r = .124$) is also found with the item 16, but it is statistically not significant. The variables of the size of windows ($r = .244$), the quality of finishing interior materials ($r = .223$) and the level of privacy ($r = .232$) displayed the same strength of correlation with the item 11, a statistically significant small positive correlation. The item 22 displayed small correlations with the items 15 and 16 as well but they are not statistically significant.

To put the results in the real-life context, the size of house, rooms and windows, the quality of finishing interior materials and the level of privacy are particularly significant physical features of house that affect the rural dwellers' overall satisfaction in Erzurum to a certain extent. Differently, the size of private lot, the direction of entrance, terrace and garden and the easiness of cleaning do not have such critical importance in the dwellers' perspective.

6.2.2.2.2 Effect of the size of household and children

Average number of households is 5 and the number of children is 3 in Erzurum. Having said that, houses with 11 households and 7 children were also observed among 80 participants; hence, with the assumption that the participants' evaluation might have been affected by these two indicators, correlation coefficient was conducted. Both correlation results, the size of households ($r = -.407$) and children ($r = -.368$) with the size of the house and rooms, are expectedly negative and at medium strength. That is, as the number of households and children increases, the satisfaction with the size of the house and rooms decreases. This relation exists

across the target population by no chance since both correlations are statistically highly significant. As a note, the numbers of households and children have also negative small correlation with the dwellers' overall satisfaction with their houses; but, the correlations are statistically not significant, neither linear nor monotonic.

6.2.2.2.3 Effect of relocation

To discover how differently the relocated (60) and not-relocated (20) dwellers evaluated the evaluation questions and related items, independent-samples t-test was conducted. By looking at Table 6.30, it can be stated that the not-relocated participants scored higher the items given than the relocated participants. The results portray that the dwellers not-relocated are happier in general. To say, they are more satisfied with their houses and find it better than the former. Their expectations were also met at a high level according to the results. In turn, they are less likely to leave their current post-earthquake houses. Nonetheless, this does not mean the relocated participants are not happy at all or less satisfied with the implementations; indeed, their scores also indicate similar outcomes as their scores are also above 4 in the scale; but their mean values are less overall.

Compared to the results of Van, the mean values of the items 11, 12, 15, 16 and 58 are higher in the case study of Erzurum. This can be interpreted as the dwellers in Erzurum are generally more satisfied with the implementations. Notwithstanding, the mean values of the items 59 and 60 are considerably higher for both groups in Erzurum. That is, in terms of 'missing the former house and the settlement', the not-relocated group in Van scored 1.81; whereas it is 2.35 for the same group of Erzurum. To a certain extent, this implies that the dwellers in Erzurum have a particular longing to their former houses though they were not relocated. That being said, the relocated group of Erzurum is a bit less likely to consider leaving their house, with 1.95 mean value, while it was 2.57 for the same group of Van. This relatively different result can be explained by the stronger attachment of the rural dwellers in Erzurum than the participants in Van, and the economic circumstances of the dwellers as well, which is more agriculture-independent for the dwellers of Van, and more agriculture-dependent for the dwellers of Erzurum. Despite the mean value differences, statistically the only significant difference between the relocated and not-relocated groups is found for the item 12, which asked the participants to compare their current post-earthquake houses with their former houses. The significance of the difference between groups is verified through one-way ANOVA between-groups test and from there the effect size of this relation is estimated, which is only .04 - a very

small effect size. Despite the fact, this does not necessarily mean the relation affects only a small portion of the target population; indeed, it affects significantly, but more likely to be a reasoning in the context of the item 12.

Table 6.30 The mean values and standard deviation of two relocation groups in Erzurum.

	Groups	N	Mean value	S.D.
Q11 How much are satisfied with your current house?	Not relocated	20	4.85	.489
	Relocated	60	4.53	.892
Q12 Do you find your current house better than the one you had previously?	Not relocated	20	4.95	.224
	Relocated	60	4.68	.624
Q15 In what level were your expectations satisfied in your current house?	Not relocated	20	5.00	.000
	Relocated	60	4.88	.585
Q16 How much do you wish to live in this house for the rest of your life?	Not relocated	20	5.00	.000
	Relocated	60	4.93	.312
Q58 Your current living standard is better than the earlier.	Not relocated	20	4.80	.616
	Relocated	60	4.62	.846
Q59 You miss your former house and settlement.	Not relocated	20	2.35	1.496
	Relocated	60	2.70	1.740
Q60 You may consider leaving your current house in future.	Not relocated	20	1.90	1.651
	Relocated	60	1.95	1.523

To relate the significant differences between two groups for the item 59 in the case study of Van, and for the item 12 in the case study of Erzurum, an accurate interpretation can be done by looking back at their mean values. To say, considering the relocated participants' higher tendency of leaving their house in future in Van, and the not-relocated participants' higher satisfaction with their houses since they largely found better than their former houses; it can be concluded that rural dwellers are strongly against relocation of their dwellings.

6.2.2.2.4 Effect of the demographic characteristics

Have found a difference between the age groups for the item 60 the case study of Van, a similar relation is sought for Erzurum through one-way ANOVA between-groups. However, no statistically significant difference resulted. Afterwards, differences between the age groups are also sought for six evaluation items; but, none of them is distinguished with a statistically significance. To explain through the effect size, the differences of the mean values between the age ranges under each item had a considerably small effect size that varies from .02 to .08. Hence, they were neither statistically nor practically observable.

With regard to the relation found between the livelihood groups for the item 60 in Van, a likely difference between three livelihood groups in relation with the items 58, 59 and 60 are sought for Erzurum as well. One-way ANOVA between-groups followed with Tukey HSD post-hoc test are conducted for this reason, however, no statistically significant differences were found.

Despite this, by looking at the mean values of the livelihood groups for the item 60, it can be said that the dwellers in the group of urban labour had more tendency of considering leaving their houses in the future ($M=2.30$) compared to the group of agriculture ($M=1.55$).

For the item 58, the mean values of two groups, urban labour and agriculture, highly differed from that resulted in the case study of Van. Both groups scored higher than the dwellers in Van, which means the dwellers in Erzurum strongly agreed on that they found their current living standards better than the earlier. In detail, the mean value of the agriculture group was 4.17 for Van and it is 4.76 for Erzurum; the mean value of the urban labour groups was 3.68 for Van and it is 4.61 for Erzurum. For the item 59, neither inferentially nor descriptively such particular results identified.

One-way ANOVA between-groups is conducted to explore if three livelihood groups differ from each other when they were asked to compare the quality of their post-earthquake houses and the loans. However, no statistically significant difference was found and with the cross-tabulation it is attempted to explore descriptively the differences between the groups (Table 6.31). It can be drawn that the majority in Erzurum do not find the quality of their houses worth to the amount of the loan. Indeed, they find the houses rather low quality, which will be explored through the interviews. The rankings of the groups yielded in similar pattern. Further, the mean value of the agriculture group in Erzurum is quite lower as it is 2.39, while it was 3.21 for the same group in Van. The result suggests that the majority of the participants in Erzurum were dissatisfied with the quality of their houses.

Table 6.31 Cross-tabulation of livelihood groups and worthiness of the houses in Erzurum.

	Ranking	Agriculture	Urban labour	Other/retired	Total
Q69	0 N.A	1	2	6	9
	1 Strongly disagreed	13	6	7	26
	2 Disagreed	8	7	5	20
	3 Ambivalent	1	3	4	8
	4 Agreed	3	3	2	8
	5 Strongly agreed	7	2	0	9
Total		33	23	24	80

To elaborate this finding, correlation is conducted on the variable 25 and the item 69. Expectedly, a small positive correlation ($r=.233$) is found between two. Further, as the correlation does not violate the assumption of linearity, it can also be drawn that the quality of interior finishing material is an underlying indicator at assessing the worthiness of the houses to the loans, which will also be elucidated through the interviews.

The cross-tabulation in Table 6.32 uncovers the functional use of barns among different livelihood groups. Firstly, it should be noted that 50 of 80 participants are entered as ‘not available’ because they do not use their barns to keep their livestock. Indeed, few transformed their barns into a secondary residential unit as they did not own livestock, or they were only entitled to a residential unit without barn (and thereby live in a single-story house). Few had built their barns by themselves and few kept using their former barn in former settlement. In the end, 30 participants use their barns in accordance with its functional purpose, and as to the distributions, the agriculture group is in the first place with 19 participants. The distributions are similar to the pattern observed in the case study of Van.

Table 6.32 Cross-tabulation of livelihood groups and the use of barn in Erzurum.

	Ranking	Agriculture	Urban labour	Other/retired	Total
Q36	0 N.A	14	18	18	50
	1 Strongly disagreed	2	0	1	3
	2 Disagreed	2	1	0	3
	3 Ambivalent	9	1	0	10
	4 Agreed	2	2	2	6
	5 Strongly agreed	4	1	3	8
Total		33	23	24	80

6.2.2.2.5 General relations between selected factors

In addition to the correlations of 11 with 15,16 and 22, which are previously found and explained with reference to the physical features of the houses, a large positive and statistically highly significant correlation ($r=.749$) is also found between the items 11 and 12. This can be understood as the participants have assessed their overall satisfaction with their current post-earthquake houses by comparing with their former houses as their scores distributed in a linear relation. The item 12 has also statistically significant small positive correlations with 16 ($r=.249$) and 22 ($r=.239$). This can be explained as the better they find their current houses, the more wish they have to continue living in their houses and this relation strongly exists across the target population. The more they are satisfied with the size of the house and rooms, the better they find their current houses than the former. Similar relation also exists between 15 and 58 ($r=.271$), which can be understood as the expectations met play a role to some extent at assessing the quality of living standards from the perspective of the participants.

A similar understanding can be drawn from the relations of the item 58 with 59 and 60; both are medium statistically highly significant negative correlations ($r=.450$ and $r=.419$). To explain, the participants miss their former house and settlement and become more likely to

consider leaving their current post-earthquake houses, unless they find their living standards better than the earlier. The positive medium correlation ($r=.459$) found between 59 and 60 is also contained in this conclusion.

Understanding how much the dwellers are happy with the type of the structural system of their post-earthquake houses and how much they feel safe considering the seismic-resistance of the houses, the items 13 and 44 are analysed through correlation seeking which items they are in relation with. Considering the popularity of RC frame construction in rural areas, when the participants were questioned with the item 13, they mostly confirmed the structural type of their post-earthquake houses since the houses were built as RC frame structures. Some also mentioned that they would have wanted to build a house in the same type, but was not able to due to the economic circumstances, which was examined better through the interviews. Hence, the high score of the mean value of 13 ($M= 4.95$) can be understood with this trend.

Accordingly, the statistically significant small correlation between 13 and 15 ($r=.244$) can be interpreted as the construction material and the structural system of the houses widely met the dwellers' expectations as they already had a wish to build alike. Similarly, the medium correlation found between 13 and 12, which is statistically highly significant ($r=.332$) can also be understood as they conditionally find the post-earthquake houses better than their former houses since they are built as they expected. These underpinnings extending to finding the living standards better than the earlier explains the statistically significant medium correlation between 13 and 58 ($r=.450$).

Looking at the distribution of the scores for the item 44 in Table 6.33, it can be said that the dwellers averagely feel safe in their houses and rely on the seismically resistance. The relation between the items 44 and 58 resulted with statistically significant small positive correlation ($r=.277$). In real-life context, this might be the results of finding the structural type of the post-earthquake houses more reliable than the local housing type.

Table 6.33 The distribution of the scores in Erzurum for the item 44.

5-point Likert scale	1 Strongly disagree	2 Disagree	3 Ambivalent	4 Agree	5 Strongly agree	N.A	Total
Q44	1	6	17	17	39	0	80
%	1.3	7.5	21.3	21.3	48.8	0	100

This viewpoint may also guide to understanding the statistically significant medium negative correlations of 44 with 59 ($r=-.315$) and 60 ($r=-.337$). To say, relying on the structural type of the houses makes dwellers less longing for their former houses and settlements, thus, less likely to consider leaving the houses.

Considering a decade-time passed since the dwellers were residents in their post-earthquake houses, it was investigated how widely the dwellers altered their buildings and what kinds of alterations they did. As expected, 77 of 80 participants have altered their buildings. They have been asked which spaces of their houses they altered and what they applied.

Changing floor coverings, window frames, taps, sinks, kitchen cupboards and refreshing wall-paint were the most common alterations and maintenances regarding the interior house. About the exterior house, covering the entrance with a primitive shed or extending outwards as a welcome area, and partially or fully covering the outdoor stairs of two-storey buildings were the most common alterations. In some exceptional cases, few dwellers transformed their barns, either that in the ground floor or that as singular unit, into a residential unit to take the advantage of more exterior spaces to shelter their children or their elder parents. There were also few participants did similar transformation besides building a separate barn.

The dwellers altered their house strongly agreed ($M=4.93$) on that they have done the alterations with the aim of maintaining their houses. When they were asked if they had decided further alterations to apply soon, most of them agreed by emphasising they were not in a position to afford further expenses and had already changed and repaired the most necessary. Even the majority agreed to do, the mean value indicated they were more ‘ambivalent’ ($M=3.60$) to the statement, which can be understood as the concern of economic circumstances (Table 6.34).

Table 6.34 Cross-tabulation of livelihood groups and the alterations for Erzurum.

	Ranking	Q37		Total
		Have you done any alterations in your house?		
		Yes	No	
Q40 You will do further alterations in your house in future.	0 N.A	5	2	7
	1 Strongly disagreed	13	0	13
	2 Disagreed	4	0	4
	3 Ambivalent	7	0	7
	4 Agreed	2	0	5
	5 Strongly agreed	44	1	45
Total		75	3	80

6.2.3 The case study of Erzincan

The fieldwork was far challenging than that was undertaken in Erzurum and Van. This was mainly because of the settlements visited had become peripheral areas of the city centre and administered as district municipalities; thereby, the community characteristics were different. The analyses of 80 questionnaires yielded a variety of conclusions sufficient to discover the changes in Erzincan.

6.2.3.1 Descriptive analyses

Given the two-decade time passed after the 1992 earthquake and the following transformation in the built environment and adaptation in social life, the demographic characteristics of the participants differed than the participants in Van and Erzurum.

6.2.3.1.1 Demographic characteristics of the samples

Three was the most common observation with a share of 25% in 80 as the size of household, which is quite unusual in the region. Two households followed with 18 and 5 households followed with 13 cases. The average number of households per house was 4. There was one exception in Yalnızbağ with 15 households including 7 children, were a family who had bought the post-earthquake house only few years after the delivery of the house to the original beneficiary (Table 6.35).

Table 6.35 The distribution of the number of households in Erzincan.

No. of household	1	2	3	4	5	6	7	8	15	Total
Frequency	4	18	20	10	13	6	5	3	1	80
%	5,0	22,5	25,0	12,5	16,3	7,5	6,3	3,8	1,3	100

Given the high frequencies of one household, 2 and 3 households, having no child observed in 33 was not unexpected (Table 6.36). Having one child followed it with 15 cases. The average number of children was one, which is quite different from Erzurum and Van.

Table 6.36 The distribution of the number of children in Erzincan.

No. of children	0	1	2	3	4	5	6	7	Total
Frequency	33	15	12	14	2	1	2	1	80
%	41,3	18,8	15,0	17,5	2,5	1,3	2,5	1,3	100

The participants in Erzincan are more aged than the participants of Erzurum and Van. The number of participants in the age range of 50-65 was 32, and 27 participants were over 65. The number of younger participants was considerably smaller as shown in Table 6.37.

Table 6.37 The distribution of the age groups in Erzincan (*m.d: missing data).

Age groups	18-34	35-49	50-65	65+	m.d*	Total
Frequency	7	11	32	27	3	80
%	8,8	13,8	40,0	33,8	3,8	100

The distribution of the participants' education levels did not differ severely from the participants of Erzurum and Van. Nevertheless, given the number of participants over 65 and including few more close to 65, the number of participants with no education and only with primary school was the highest in three case studies as shown in Table 6.38.

Table 6.38 The distribution of the education levels in Erzincan.

Education level	none	primary	secondary	high school	university	m.d	Total
Frequency	8	29	7	12	15	9	80
%	10,0	36,3	8,8	15,0	18,8	11,3	100

The share between the relocated and not-relocated dwellings were alike the shares observed in Erzurum and Van (Table 6.39). However, in terms of the number of the house owners that were not original beneficiaries of the post-earthquake houses, Erzincan severely differed from Erzurum and Van. In total, 15 house owners were encountered who were not the original beneficiaries as few had sold their post-earthquake houses and few had left the houses to their relatives. Compatibly, different periods of occupation of the participants are given in Table 6.40. As a note, if the participants stated they bought the post-earthquake house they currently occupied, they were recorded as 'owner'. In this case, only 6 of 15 remained as other types of occupier. Hence, the number of participants who were residents in their houses for over 20 years and the number of 'owners' in Table 6.41 are not relatable.

Table 6.39 The distribution of the relocation status of the houses in Erzincan.

Settlement type	Relocated	Not relocated	Total
Frequency	52	28	80
%	65,0	35,0	100

Table 6.40 The distribution of the dwellers' permeant occupancy in Erzincan.

Duration of occupancy (years)	0-1	1-5	6-10	11-15	16-20	20+	N.A	Total
Frequency	4	5	2	3	1	63	2	80
%	5,0	6,3	2,5	3,8	1,3	78,8	2,5	100

Table 6.41 The distribution of the occupancy types in Erzincan.

Householder type	Owner	Tenant	Kin-rent paying	Kin-not paying	Total
Frequency	74	2	2	2	80
%	92,5	2,5	2,5	2,5	100

Considering the time passed and the number of the dwellers that were not the beneficiaries, a small number of participants were able to respond accurately the question checking the length of stay in temporary shelters following the earthquake in 1992 (Table 6.42). Notwithstanding, 32 participants stated that the length of their temporary accommodation was around 7-12 months and 24 participants had stayed in temporary shelters for less than 6 months. Only one participant stated that they stayed more than one year in temporary shelter.

Table 6.42 The distribution of the length of temporary shelter stay in Erzincan.

Temporary shelter stay (months)	0-6	7-12	12+	Do not remember	N.A	Total
Frequency	24	32	1	6	17	80
%	30,0	40,0	1,3	21,3	7,5	100

Like in Erzurum, migration did not emerge as a solution among the dwellers after the 1992 earthquake as only 4 of 80 participants stated that they had left Erzincan for a temporary period of time (Table 6.43). It was also found that more than half of the participants had experienced the earthquake severely since they had become homeless afterwards (Table 6.44).

Table 6.43 The distribution of the migration status of the participants in Erzincan.

Migration	Yes	No	Total
		/N.A	
Frequency	4	76	80
%	5,0	95,0	100

Table 6.44 The distribution of the house damage in Erzincan.

Condition of previous house	No damage	Damaged	Heavily damaged	Collapsed	N.A	m.d	Total
Frequency	1	12	27	26	13	1	80
%	1,3	15,0	33,6	32,5	16,3	1,3	100

6.2.3.1.2 General evaluation of reconstruction-related issues

The participants' overall satisfaction with the post-earthquake houses did not score far different than the dwellers in Erzurum and Van as it is 4.46. Nevertheless, the mean value of 15 was higher than that of Van and lower than that of Erzurum, though it still indicates that the dwellers in Erzincan were highly satisfied with the houses considering their expectations. Despite, it should be noted that most participants mentioned that as the time passed they had got used to their houses even if they had had more expectations for their houses (Table 6.45).

Table 6.45 The distribution of the scores for the question 11 (How much are you satisfied with your current house?), and 15 (In what level were your expectations satisfied in your current house?).

5-point Likert scale	1 Strongly disagree	2 Disagree	3 Ambivalent	4 Agree	5 Strongly agree	N.A	Total	Mean value
Q11	1	2	4	15	56	2	80	
%	1,3	2,5	5,0	18,8	70,0	2,5	100	4.46/5.00
Q15	0	0	4	3	67	6	80	
%	0	0	5,0	3,8	83,8	7,5	100	4.49/5.00

The particular observation in Erzincan was that some rural dwellers were not permanent residents in post-earthquake houses since they have migrated out from the villages. They temporarily occupy their houses, mostly during summer using as vacation house. Thereby, during the fieldwork in the villages a large number of houses were appeared unoccupied since the end of the summer season was approaching. A few of such temporary dwellers were included in the survey.

When the participants were asked whether they would consider leaving their houses in future or not, most dwellers mentioned that if they had ever considered leaving their houses, they would have already done so, pointing the two-decade time passed. Accordingly, the mean value 1.10 of the item 60 surely indicates that the dwellers did not leave their houses thus far will continue living in their post-earthquake houses. From the other way around, the number of the participants strongly agreed to the statement in 16 also includes the dwellers who benefit the post-earthquake houses seasonally since they were never completely tend to leave or sell their houses even if they come only in certain times of the year (Table 6.46).

Table 6.46 The distribution for the question 16 (How much do you wish to live in this house for the rest of your life?), and 60 (You may consider leaving your current house in future).

5-point Likert scale	1 Strongly disagree	2 Disagree	3 Ambivalent	4 Agree	5 Strongly agree	N.A	Total	Mean value
Q16	0	0	1	4	65	10	80	
%	0	0	1,3	5,0	81,3	12,5	100	4.30/5.00
Q60	57	2	1	1	4	15	80	
%	71,3	2,5	1,3	1,3	5,0	18,8	100	1.10/5.00

The participants in Erzincan did not score different than the participants in Van comparing the current living standards with the earlier. Having said that, it should be taken into account that the rural dwellers in Erzincan have inevitably adapted in time much more than the dwellers in Van, which eventually changed their perspective and socio-economic circumstances in turn. Having explored how strongly the dwellers had longing for their former houses and

settlements they had two decades ago, before the earthquake, the mean value resulted for the item 59 (Table 6. 47) was the lowest among three case studies. This can be explained by the dwellers' adaptation to the built environment.

Table 6.47 The distributions for the statement 58 (Your current living standard is better than the earlier), and 59 (You miss your former house and settlement).

5-point Likert scale	1 Strongly disagree	2 Disagree	3 Ambivalent	4 Agree	5 Strongly agree	N.A	Total	Mean value
Q 58	0	1	5	4	58	12	80	
%	0	1,3	6,3	5,0	72,5	15,0	100	4.04/5.00
Q 59	24	7	8	4	21	16	80	
%	30,0	8,8	10,0	5,0	26,3	20,0	100	2.29/5.00

The participants generally portrayed different pattern than the participants of Van and Erzurum. However, further exploration is required to consolidate and better understand the general observations and the underpinnings. Accordingly, the following inferential analyses are conducted by following the same steps undertaken in the case study of Van and Erzurum.

6.2.3.2 Inferential analyses

The questionnaire data of 80 participants were operated under the same themes and same statistical models studied for Van and Erzurum.

6.2.3.2.1 Effect of the physical features of the house

The analyses are started with correlation and there is a statistically significant highly strong positive correlation ($r=.835$) between the items 15 and 16, which can be interpreted as that the dwellers are satisfied with their houses because their expectations were met quite possibly. Such relation between these two was found in the case studies of Van and Erzurum as well. It is also found that the item 11 has statistically significant medium correlations with 15 ($r=.488$) and 16 ($r=.437$). The correlation was observed in the same statistical strength with that in the case study of Van.

Only the item 11 has statistically significant medium correlations with all of the physical features. For example, the size of house and rooms had a positive correlation ($r=.498$) with 11. Notwithstanding, this does not necessarily mean that all of the participants strongly satisfied with their houses were also strongly satisfied with the size of the house and rooms. Indeed, the distribution of the rankings revealed that 7 participants dissatisfied with the size of their house

and rooms were actually strongly satisfied when they were asked to think overall the house. Similarly, 17 participants, who were neither satisfied nor dissatisfied with the size of the house and rooms, were actually strongly satisfied in overall. In real-life context, this can be understood as the dwellers might be critical on certain features of the houses, but when they are asked to think overall, they might consider other factors, thereby they ignore or absorb the factors that they were critical about.

Additionally, the size of house and rooms, the size of windows, the size of private plot and level of privacy, and the easiness of cleaning the house were the indicators in positive correlations with the items 15 and 16. To say, these physical features are the indicators that the dwellers consider to a certain point as expectations and factors raising their wish to live in their post-earthquake houses.

Further, the size of private lot had the lowest mean ($M=2.99$) value compared to the result observed in Erzurum and Van. That is, the participants in Erzincan were less satisfied than the dwellers in Erzurum and Van as they complained that the area surrounding their houses was not large enough. Satisfaction with the quality of interior finishing material of the houses also had the lowest mean value ($M=2.51$) of all. In detail, the number of the participants strongly satisfied with the quality of interior finishing materials was only 5 in 80, while the participants strongly dissatisfied were 20, which eventually decreased the mean value. Differently, the relatively low mean value of the variable 29 was actually the result of the participants' low ranking as much as the number of the participants unavailable to commend due to their seasonal occupation and not experiencing the winter season and heating problems.

6.2.3.2.2 Effect of the size of household and children

Despite the average number of households and children are lower compared to that of Van and Erzurum, the strength and the direction of their correlations with the size of the house and rooms displayed the same statistical pattern with Van and Erzurum. That is, the effect of the number of households and children negatively influence the evaluation of the size of house and rooms. This can also be explained in association with the fact that the houses were standardised to only one typical plan. With the items 15 and 16, the variables of the number of households and children have negative, small but statistically not significant correlations. This implies that, despite the significant small positive correlations between 15 ($r=.266$) and 16 ($r=.250$) with the size of house and rooms found previously, the effect of the number of households and children

is straightforward on the items 15 and 16. This is also the result observed in the cases of Van and Erzurum.

6.2.3.2.3 *Effect of relocation*

The mean values revealed that the relocated dwellers have higher score than the not-relocated dwellers in terms of overall satisfaction with their post-earthquake houses as seen from Table 6.48. They also scored higher than the not-relocated group considering their expectations and how much they were satisfied with them. Moreover, the relocated dwellers find their living standards far better than the former and have a far stronger wish to live in their houses as much as they find their post-earthquake houses better than the not-relocated group. Since the differences between groups were unlike to that observed in the case studies of Van and Erzurum, one-way ANOVA between-groups was conducted to verify the differences found and to estimate their effect sizes to relate with the target population. It is found that the differences between relocated and not-relocated groups for 11 and 12 have a medium effect size since their eta square values are 0.09 and 0.12 respectively. The eta square values of the items 15 and 16 are 0.23 and 0.22, i.e. large effect size according to Cohen's d classification.

Through cross-tabulations of 58, 59 and 60 the background of the differences between groups is explored. Basically, lower scores of the not-relocated group were largely the result of the 'not available' input, which represents the dwellers that occupy their houses seasonally and that are not the original beneficiaries of the houses. From the distributions, it can be drawn that the dwellers not-relocated were not happy with the implementations, as the mean values of 11, 12 and 15 verify this assumption, and thus they had turned out being more prone to migrate or sell their houses, unlike the relocated dwellers.

Table 6.48 The mean values and standard deviation of two relocation groups in Erzincan.

	Groups	N	Mean value	S.D.
Q11 How much are satisfied with your current house?	Not relocated	28	4.04	1.598
	Relocated	52	4.69	.544
Q12 Do you find your current house better than the one you had previously?	Not relocated	28	4.07	1.741
	Relocated	52	4.88	.379
Q15 In what level were your expectations satisfied in your current house?	Not relocated	28	3.61	2.043
	Relocated	52	4.96	.194
Q16 How much do you wish to live in this house for the rest of your life?	Not relocated	28	3.25	2.139
	Relocated	52	4.87	.715
Q58 Your current living standard is better than the earlier.	Not relocated	28	2.68	2.450
	Relocated	52	4.77	.581
Q59 You miss your former house and settlement.	Not relocated	28	1.14	1.458
	Relocated	52	2.90	1.881
Q60 You may consider leaving your current house in future.	Not relocated	28	.61	.685
	Relocated	52	1.37	1.172

6.2.3.2.4 Effect of the demographic characteristics

The differences between the scores of the age ranges are tested through one-way ANOVA between-groups. The results did not yield any particular differences between the age groups³⁸. There were also no statistically significant differences between the livelihood groups for 58, 59 and 60. Nevertheless, the mean value of the urban labour group is lower than the agriculture (M=4.00) and the other/retired (M=4.17) for the item 58. This means the participants from this group do not think that their living standards are better than their earlier conditions as much as the other livelihood groups do. That being said, the cross-tabulations in Table 6.49 indicate that the majority of the participants (52 of 60 valuable data) strongly agreed on that their living standards were better comparing to their pre-earthquake conditions. Compatibly, nearly the same majority (50 of 60 valuable data) strongly disagreed on that they might consider leaving their houses in future. In terms of place attachment, the distribution of 59 implies that some participants had strong emotional bound to their former house and settlement whereas some did not have any bound or longing at all.

Table 6.49 Cross-tabulation of the livelihood groups and the items 58, 59 and 60 for Erzincan.

	Ranking	Agriculture	Urban labour	Other/retired	Total
Q58	0 N.A	2	2	7	11
	1 Strongly disagreed	0	0	0	0
	2 Disagreed	0	1	0	1
	3 Ambivalent	1	2	1	4
	4 Agreed	2	0	1	3
	5 Strongly agreed	9	6	37	52
Total		14	11	46	71

	Ranking	Agriculture	Urban labour	Other/retired	Total
Q59	0 N.A	2	3	8	13
	1 Strongly disagreed	5	2	15	22
	2 Disagreed	0	0	6	6
	3 Ambivalent	2	0	4	6
	4 Agreed	0	2	2	4
	5 Strongly agreed	5	4	11	20
Total		14	11	46	71

	Ranking	Agriculture	Urban labour	Other/retired	Total
Q60	0 N.A	3	2	8	13
	1 Strongly disagreed	9	7	34	50
	2 Disagreed	1	0	1	2
	3 Ambivalent	0	0	1	1
	4 Agreed	0	1	0	1
	5 Strongly agreed	1	1	2	4
Total		14	11	46	71

³⁸ Except for the items 58 and 59, for which the age range of 18-34 significantly differed from the other groups. The cross-tabulation revealed that the significances found for the age group were the result of the distortion due to the number of not available data, which decreased the mean value of the 18-34 age group as the size of the groups is already the smallest, which is only 7, comparing to the sizes of the other age groups.

The cross-tabulation in Table 6.50 reveals the differences between the livelihood groups in terms of how they use the barns. Unlike the case studies of Van and Erzurum, in Erzincan the proportion of the other/retired group is considerably high compared to the agriculture and urban labour groups. This can clearly be deemed as the result of the social adaptation occurred in the past two decades and the comparatively aged population, who is retired and under the insurance of a pensioner scheme; thereby, they have regular monthly income. The agriculture-dependent group was considerably small and only few were using their barns actively, while nearly the half uses the barn buildings for different purposes.

Table 6.50 Cross-tabulation of the livelihood groups and the use of barn in Erzincan.

	Ranking	Agriculture	Urban labour	Other/retired	Total
Q36	0 N.A	6	9	37	52
	1 Strongly disagreed	0	0	0	0
	2 Disagreed	1	0	2	3
	3 Ambivalent	2	0	0	2
	4 Agreed	3	0	2	5
	5 Strongly agreed	2	2	5	9
Total		14	11	46	71

6.2.3.2.5 General relations between selected factors

Further correlation analyses were operated and a highly strong positive correlation between the overall satisfaction of the dwellers with their houses and how better they find their post-earthquake houses than their pre-earthquake houses ($r=.879$) was found. The correlations of 11 with 15 and 16 were mentioned previously along with the correlations found with 22 and 25, the physical features of the house. There is a statistically significant small positive correlation ($r=.328$) between 11 and 58, which means the higher the dwellers satisfied with their houses overall, the more they agree on their living standards are better than that they had earlier.

The results also reveal that the quality of interior finishing materials has a small correlation ($r=.230$) with 12, which suggests that the dwellers refer the quality of interior finishing materials to some extent when they evaluate their houses in overall. Besides, the dwellers consider this physical feature when they evaluate their living standards, as it is approved with a statistically significant medium positive correlation between the items 12 and 58 ($r=.384$).

Both the items 15 and 16 have correlations with the items 58, 59 and 60, which are particular to Erzincan. The strong correlation of 58 with 15 and 16 can be interpreted as that the higher the dwellers' expectations are met, the better they find their living standards than the earlier, and that may eventually raise their wish to continue living in their post-earthquake houses.

Rather smaller but statistically significant medium correlations of 59 and 60 with 15 and 16 are investigated in further through a cross-tabulation. Distributions revealed for the item 60 that the majority of the participants, who strongly agreed on they had the wish to live in their houses (54 of 80) and their expectations have been heavily met (54 of 80), expectedly resulted that they strongly disagreed on that they might consider leaving the houses in future. Hence, the distributions yielded a straightforwardly understandable relation in the real-life context. Nevertheless, for the item 59, the distributions revealed that even though some participants were strongly satisfied with how their expectations have been met regarding the post-earthquake houses (20 of 80) and they have the wish to live in the houses for the future (20 of 80), they still strongly feel longing to their former houses and settlements.

With regard to the result that not-relocated dwellers were less satisfied with the implementations compared to relocated dwellers, a cross-tabulation is studied for the item 44 to reveal if the relocation status made a difference at feeling safe and relying on the seismic-resistance of their post-earthquake houses. As to the distribution presented in Table 6.51, most of the relocated participants agreed to the statement given; whereas, the number of not-relocated participants agreed was proportionally half of the group. As a reminder, the mean value of not-relocated group was estimated 3.36 while it was 4.06 for the relocated group.

Table 6.51 Cross-tabulation of the livelihood groups and the item 44 for Erzincan.

	Ranking	Relocated	Not-relocated	Total
Q44	0 N.A	1	2	3
	1 Strongly disagreed	0	1	1
	2 Disagreed	3	5	8
	3 Ambivalent	8	4	12
	4 Agreed	17	4	21
	5 Strongly agreed	21	9	30
Total		50	25	75

To explore if feeling in safe and relying on the seismic-resistance of the houses are related, a correlation is conducted for the item 44, which resulted with statistically significant medium positive correlations between 13 ($r = .309$), 15 ($r = .370$), 16 ($r = .345$) and 58 ($r = .461$). To interpret, the dwellers prefer the structural system of their permanent houses as they feel safer and rely on its seismic-resistance. As a further interpretation, since the houses have been built after a severe earthquake and entitled 'post-earthquake houses', the dwellers' expectations seemed met in this regard. It can also be derived that since they feel safer in their post-earthquake houses, they tend to think their living standards rise; and, the more they feel safe

they have higher wish to live in the houses. More importantly, all of these relations can be observed across the target population in Erzincan since the correlations are highly significant.

Finally, it was discovered how largely the dwellers altered their houses in the past two-decade time. Simply, the question of whether they had any kind of alterations or modifications done to their houses revealed that 74 participants have done various changes. In detail, 58 of 74 had altered at least two spaces in their houses, 7 only modified the entrances. Another 7 altered only one bedroom, and the remaining 2 only altered their kitchen. The alterations varied from replacing window frames with PVC profiles, painting the interior and exterior walls, renewing doors and floor coverings, applying insulation under the roof, renewing the drainage pipes of toilets and kitchen, and changing taps. 52 of 74 had done at least two of these alterations, while 22 had only done one kind of alteration. As a special note, the number of the participants altered their houses is equal to the number of house-owners, which suggests the house owners had more of the sense of ownership for their post-earthquake permanent houses. The remaining 6 are of other types of occupants, who were previously detailed in the demographic characteristics. Since they had not done any changes in the houses, it can be drawn that they had less sense of ownership for the houses. After all, the majority agreed on that the alterations they had done were necessary to maintain their house and to better facilitate their needs; and, more than half of the participants agreed on that they would apply further alterations in time.

6.3 Cross-cases analyses and results

Have the case studies explored separately; now taking the advantage of multiple-case study, the following analyses are conducted by including all of 240 questionnaire data. To explore the differences and similarities between the case studies, the results are compared between the provinces by coding each as separate group, i.e. Van=1, Erzurum=2 and Erzincan=3. As done so far, the demographic characteristics are followed by the inferential analyses.

6.3.1 Descriptive analyses

The following outputs depict the overall characteristics of 240 samples and presented in a summarising table (Table 6.52) followed with the overall evaluation results (Table 6.53).

6.3.1.1 Demographic characteristics of the samples

Across 240, 5 households is the most common observation as it is observed in 43 cases, and followed by 3, 6 and 7 households that each is observed in 32 cases. Having four households is observed in 30 and 2 households followed with 27 cases. The case of 15 households remained

as an exception since it was observed only once. It was unexpected to observe the case of 'no children' as the most common, 51 of 240, considering the regional characteristics. Nevertheless, this can be given to the number of elder people living alone. Having 3 children was the second most common observation with 44 cases, which was followed with having 2 children. '9 children' was an exception and 3 children is the average of all.

The majority of the participants fell under the age group of 35-49, and followed by the age group 50-69. Based on the fieldwork observations, it was mostly the elders with no education. Younger generation was more into continuing a university degree. Accordingly, the number of participants with university education and the number of participants under the age group of 18-34 can be related and considered compatible with the observation. Nevertheless, the majority of the participants are with only primary school education, and given the changing regional characteristics, these participants generally fell under the age group 50-65 and above 65. The number of participants with high school education was 60 and generally shared between the age groups 18-34 and 35-49.

Nearly 70% of 240 post-earthquake houses had been constructed in locations and sites other than their original places. The majority of the participants were the beneficiaries of the post-earthquake houses. Only 4 houses were given as rentals, whereas 20 were occupied by the relatives of the beneficiaries. Only 5 relatives pay a small amount of rent.

Over 80% of the participants' former houses suffered heavy damage or collapsed. Therefore, it can be understood that the areas studied were strongly affected by the earthquakes so as the participants had experienced disasters severely. Only one participant's house had no damage, and despite the fact, they were identified as a beneficiary because they had wanted so.

The majority had stayed in temporary shelters - the tents and container units- for a period of time - around one year- until they had resettled in their post-earthquake houses. However, some of the participants had stayed in temporary shelters only for six months or less as then they had migrated out until the completion of their post-earthquake houses.

The group of agriculture contained the largest number of the participants (most are in Van), and the group of other/retired followed in the second place (most are in Erzincan). The number of the participants who works as a labour force in urban areas was also large enough with almost 25% of 240.

Table 6.52 The distributions of the demographic characteristics of three case studies.

No. of household	1	2	3	4	5	6	7	8	9	10	11	12	14	15	Total
Frequency	9	27	32	30	43	32	32	13	8	7	3	1	2	1	240
%	3,8	11,3	13,3	12,5	17,9	13,3	13,3	5,4	3,3	2,9	1,3	0,4	0,8	0,4	100

No. of children	0	1	2	3	4	5	6	7	8	9	Total
Frequency	51	30	41	44	34	15	14	7	3	1	240
%	21,3	12,5	17,1	18,3	14,2	6,3	5,8	2,9	1,3	0,4	100

Age groups	18-34	35-49	50-65	65+	m.d*	Total
Frequency	45	76	69	44	6	240
%	18,8	31,7	28,8	18,3	2,5	100

Education level	none	primary	secondary	high school	university	m.d	Total
Frequency	19	69	33	60	45	14	240
%	7,9	28,8	13,8	25,0	18,8	5,8	100

Settlement type	Relocated	Not relocated	Total
Frequency	165	75	240
%	68,8	31,3	100

Householder type	Owner	Tenant	Kin-rent paying	Kin-not paying	Total
Frequency	216	4	5	15	240
%	90,0	1,7	2,1	6,3	100

Condition of previous house	No damage	Damaged	Heavily damaged	Collapsed	N.A	m.d	Total
Frequency	1	26	93	105	14	1	240
%	0,4	10,8	38,8	43,8	5,8	0,4	100

Temporary shelter stay (months)	0-6	7-12	12+	Do not remember	N.A	Total
Frequency	66	100	46	8	20	240
%	27,5	41,7	19,2	3,3	8,3	100

Livelihood type	Agriculture	Urban labour	Other/retired	m.d	Total
Frequency	89	59	83	9	240
%	37,1	24,6	34,6	3,8	100

6.3.1.2 General evaluation of reconstruction-related issues

Considering the scores of the entire sample, it can be said that the rural residents in post-earthquake houses implemented by the state are quite satisfied with their houses as the mean value for the item 11 was 4.53. The majority was strongly satisfied as the participants in Erzurum made the highest mean value. The score of the item 15, which is 4.54, also suggests that the implementations were successful considering the vast majority was strongly satisfied with regard to their expectations.

The mean value of the item 16 resulted with 4.57, which suggests that most of the participants strongly agreed on keep living in their post-earthquake houses. Despite this, it should be noted that during the interviews a number of participants mentioned that they would keep their post-earthquake houses even if they had the opportunity to build another house. Some clearly stated they had the ‘wish’ inevitably due to their economic boundaries. In relation to this, the large number of the participants strongly agreed to the statement in the item 58 verifies the participants’ viewpoint. To say, the dwellers would keep their post-earthquake houses in all circumstances because they comparatively find their living standards (primarily in physical context) better than the earlier. However, it should be reminded that the mean values of 58 for Van and Erzincan were lower than the total mean value of the item, which is 4.25.

The item 59 sought the extent of rural dwellers’ place attachment. Given the large number of relocated dwellers, the mean value 2.50 is understandable for this item. The share between ‘strongly agreed’ and ‘strongly disagreed’ implies that some dwellers had severe longing for their former built environment, and some had to no extent. Yet again, in relation to 16, nearly 70% of the participants disagreed to the statement given in the item 60, which implies that they were unlikely to consider leaving their houses in future. Notwithstanding, around 15% agreed to indicate that they were looking forward to leave their post-earthquake houses somehow and sometime in future.

The frequencies indicate that the participants from three case studies were quite happy with the implementations despite the considerable longing they had for their former houses and settlements. The following inferential analyses explore further details underpinning their overall satisfaction and thus provide more of a general perspective of the target population.

Table 6.53 The distribution of the scores for the evaluation questions for three case studies.

5-point Likert scale	1 Strongly disagree	2 Disagree	3 Ambivalent	4 Agree	5 Strongly agree	N.A	Total	Mean value
Q11	2	7	15	35	177	4	240	
%	0,8	2,9	6,3	14,6	73,8	1,7	100	4.53/5.00
Q15	2	2	10	15	198	12	240	
%	0,8	0,8	4,2	6,3	82,5	5,0	100	4.54/5.00
Q16	2	2	3	9	209	15	240	
%	0,8	0,8	1,3	3,8	87,1	6,3	100	4.57/5.00
Q58	1	8	22	12	178	19	240	
%	0,4	3,3	9,2	5,0	74,2	7,9	100	4.25/5.00
Q59	91	21	23	13	69	23	240	
%	37,9	8,8	9,6	5,4	28,8	9,6	100	2.50/5.00
Q60	156	11	14	5	32	22	240	
%	65,0	4,6	5,8	2,1	13,3	9,2	100	1.67/5.00

6.3.2 Inferential analyses

Although the same analytical approach is carried out for inferential analyses, in order to conduct the exploration in a clearer concept, each focus was studied under a separate title. By doing so, it was easier to recap the research findings and to draw conclusions more accurately.

6.3.2.1 Overall evaluation of the implementations

One-way ANOVA between-groups test was undertaken to explore how differed three provinces from each other based on the participants' overall evaluations. The results revealed no significant difference for the items 11 and 12; whereas, statistically significant differences between the provinces were found for the items 13, 14, 15 and 16. To better understand and interpret the differences, cross-tabulations were studied as well.

To begin with the item 13, the province of Van differed from the other two, and the cross-tabulations revealed that difference occurred due to the participants' low rankings, most probably, from the villages implemented by TOKI which were pilot projects of light-steel frame residential structures. This can be explained by that the dwellers were not fully aware of the features and the rationales behind of this particular choice in construction system. Hence, they were not as pleasant as the remaining participants in Van. This result exclusively highlights how it is important to consult with dwellers about the type of structural system to be constructed and why it is preferred over the other types of structural systems.

For the item 14, the score distributions were not different between the provinces; indeed, at least 70 of 80 in each case study were ‘strongly disagreed’ when they were asked how much they would have preferred living in a traditional house³⁹. In Van, the participants who were ‘ambivalent’ to the preference of structural system, presumably, turned out ‘satisfied’ when they asked to consider their expectations given the better physical conditions of the houses delivered⁴⁰. The distribution of the item 16 uncovered that the participants in Erzurum was the most likely to continue living in their post-earthquake houses. Despite the similarity in Erzincan and Van, a small number of participants in Van can be deemed the most likely to leave their houses as soon as they could afford to build a new one.

6.3.2.3 Effect of the physical features of the house

The correlation analyses resulted that each physical feature examined in the study had a significant relation with the items 11, 15 and 16. The strength of their relations varies from small to medium. This also implies that the physical features examined are among the key indicators according to the dwellers’ perspective in terms of increasing their overall satisfaction with post-earthquake houses. One-way ANOVA between-groups followed by post-hoc Tukey HSD test was carried out to reveal the differences between the provinces in this regard. The results uncovered that there is no difference between the participants of three provinces in terms of the evaluation of the physical features given in 24, 25, 26 and 27. Nevertheless, the mean values of 22, 23, 28 and 29 significantly differed. Thus, to better observe and to verify the differentiation between the provinces, the cross-tabulations were studied.

There is a certain difference in Erzincan since the number of the participants strongly satisfied with the size of the house and rooms is far less than that observed in Van and Erzurum. There are only 2 dissatisfied participants in Van; whereas, the number in Erzincan is 17, which decreased the mean value of Erzincan to 3.29 for the item 22. The overall mean score of 22 is 3.67 for three provinces. This can be understood in association with the fact that the dwellers in Erzincan did not have more than one option for house plan. In contrast, the beneficiaries in Van had been offered several options, and to alter it as well, which is apparently the reason of higher satisfaction of the dwellers. The beneficiaries in Erzurum had not been given options, but at least they were able to take the advantage of two-story houses by transforming barns in the ground floor. Thus, they were also more satisfied than the dwellers in Erzincan.

³⁹ Presumably, the statistical significance found for the item 14 was distorted result of the respectively high number of ‘not available’ data in Erzincan.

⁴⁰ The statistical significance is found ignorable for this item as well.

For the item 23, from the cross-tabulations it was understood that the significant difference of Van was the results of the concentrated distribution of the ‘strongly satisfied’, which increased the mean value to 4.63, while the total mean score of three provinces was 4.23. The distributions are concentrated on ‘ambivalent’ and above for Erzurum and Erzincan. However, it should be noted that the dwellers in Erzurum complained the number and size of the windows as they mentioned they were not protective from cold in winter. Despite the fact, a clear half of 240 was strongly satisfied with the size of windows of their houses.

For the item 29, the difference between Erzincan and Erzurum was found statistically significant. However, as to the cross-tabulation, the statistical difference might have resulted due to the distortion by the high number of ‘not available’ data in Erzincan, the number of participants seasonally occupy their houses. Besides, considering the fact that most dwellers in Van did not pass the winter by the time of the fieldwork, only the residents with one-year long residency were able to state that they were strongly satisfied with the easiness of heating inside the house. Despite all, it is very clear that the participants in Erzurum were less satisfied as they commonly raised the issue in the interviews that it was not easy to heat inside the houses by referring the low quality of wall materials.

The cross-tabulation of 25 explored how the participants evaluated the quality of finishing interior material used as it was found in correlation with overall satisfaction. The overall mean score was 2.79 for the item, and the mean value of Erzincan is the lowest ($M=2.51$) while the mean value of Erzurum is the highest ($M=2.98$). The results indicate that more than one third of 240 were hardly satisfied with the quality of interior finishing material. Particularly, the dwellers in Erzurum and Van highlighted the issue during the interviews.

6.3.2.2 The issue of migration

Migration after earthquake was not common across the rural communities in Erzurum and Erzincan; but it was in Van as 34 of 80 participants had migrated out for a short period of time. As the authorities adopted temporary dislocation approach in Van to provide survivors further accommodation in better conditions than tents and container units, the volume of migration in the area eventually increased. As the cross-tabulation revealed, most of the participants temporarily migrated (30 of 34) out of Van had considered it permanently, indeed. Even though, like the majority of the participants in Erzurum and Erzincan, more than half (46 of 80) in Van clearly stated that they had never intended for permanent migration. Need to mention

that the number of ‘not available’ participants in Erzincan refers to the dwellers have already migrated out permanently as they occupy their houses only seasonally.

6.3.2.4 Worthiness of the post-earthquake houses

Through independent-samples t-test, it is compared how differently the participants evaluated the worthiness of their post-earthquake houses to the loan. For accuracy purpose, the analysis only included the data of Van and Erzurum given the large number of ‘not available’ data in Erzincan as that explained above. Between Van and Erzurum a statistically significant difference is found and the cross-tabulation (Table 6.54) is studied to verify the difference. The participants in Erzurum generally found their post-earthquake houses overvalued compared to their quality, as 46 of 80 disagreed to the statement in the item 69; whereas only 17 agreed on the statement that the houses worth to the loans. This is a rather complicated issue in Van since there were two different structural system applied for housing. As the interviews revealed, some participants living in the RC frame houses strongly disagreed to the statement as they thought the quality of the materials used were far behind the quality expected considering the amount of the loan and referring to their experience and knowledge of construction sector. The participants living in the light-steel frame houses were mostly disagreed to the statement.

Table 6.54 The mean values and standard deviation of two groups on selected items.

	Ranking	Van	Erzurum	Erzincan	Total
Q69	0 N.A	12	9	55	76
	1 Strongly disagreed	9	26	0	35
	2 Disagreed	12	20	3	35
	3 Ambivalent	15	8	8	31
	4 Agreed	9	8	2	19
	5 Strongly agreed	23	9	12	44
Total		80	80	80	240

6.3.2.5 Livelihood and use of barns

The cross-tabulation in Table 6.55 shows the distribution of livelihood groups. The sample size of each group is sufficient to reflect the social adaptation in terms of livelihood. This is to say, the number of the participants in the agriculture group was the lowest in Erzincan and the largest in Van, which are accurate to the current characteristics of the provinces. In other words, rural population in Erzincan is aged and retired; mainly dependent on pensioner salaries. Rural population in Van is highly active in agriculture, young, and as a result, interested in urban employment. The interviews overlapped with this finding. The participants in Erzurum depict a medium profile between Van and Erzincan, as a transitional period.

Table 6.55 Cross-tabulate between-groups based on the rank distribution.

	Provinces	Agriculture	Urban labour	Other/retired	Total
Variable	Van	42	25	13	80
	Erzurum	33	23	24	80
	Erzincan	14	11	46	71
Total		89	59	83	231

To explore further the agricultural characteristics of the provinces and relation with the post-earthquake housing implementations, number of barn units allocated to the dwellers at the time of the delivery was also tabulated. In Erzincan 39 participants had not been allocated barn. The remaining 41 participants had been allocated as they had owned livestock at the time. This indicates the less agriculture-dependent character of rural population in Erzincan. In contrast, 62 of 80 participants in Erzurum had been allocated barn units; they had been allocated two-storey buildings in this regard. However, 7 of 62 participants were using their former barns instead of the barn in the ground floor; 5 of 62 had already rebuilt a new barn by themselves as they also did not use the barn in the ground floor. Few explained that barn in ground floor was inappropriate as the households were exposed to noise, bad odour and damp caused by the animals. Accordingly, few dwellers transformed the barn in ground floor into an extension to their residential unit to use it as a guest house or to accommodate their elder parents.

Given the high agriculture dependency of the population, in Van only 5 of 80 participants had not been allocated barn. Nevertheless, as to the fieldwork observations, it can be presumed that nearly more than 30 are likely going to use their barns for other purposes like the examples in Erzurum. Besides, few participants highlighted in the interviews that the size of barn was not sufficient for a large livestock. Few mentioned that they were going to extend the building, while few had already extended when it was under construction. Eleven participants, including who were not delivered barn, stated that they were still using their former barns.

Particularly for the examples from Van and Erzurum, it can be said that the allocations of barns were not done with reference to the potential needs of beneficiaries. Rather, it has been done quite randomly, since some own a small number of livestock only to support themselves while some own a large number of livestock as they do it as business.

6.3.2.6 Alterations to the houses

Needless to say, as a result of the standardised implementations, dwellers often need to alter their buildings according to their needs. The majority of beneficiaries in Erzurum and Erzincan had already done so, as the examples given thus far. In Van, as they recently resettled, only 24

of 80 participants altered their houses to a small degree. When the types of alterations are examined, it was found that adding shed to the entrance of house was the most commonly observed alteration in all 240. The interviewees explained this to prevent the loss of interior heat through the door and to provide more privacy. Particularly, the participants in Erzurum backed their reasons by implying the cold weather they suffer for most of the year and their conservative living style. Apart from extending and covering entrances and transforming barns into additional residential units, all of the other kinds of alterations done by the dwellers mainly aimed to maintain their houses and to increase the quality of interior finishing materials since they commonly complained. Understandably, alterations for maintenance were essential for the dwellers in Erzincan since the houses were delivered in 1992. In Erzurum, 22 participants stated that they altered only their bedrooms and 20 altered only the entrances. Two stated they only altered the bathrooms and one altered only the living room. Thirty-three of 80 altered at least two of these spaces as they had renewed the finishing material and refreshed wall paints. The variety of alterations was not any different in Van.

6.3.2.7 House loans and expenses

The beneficiaries in Van are in the period of *moratorium*, so are the participants. The period will end by 2015. Therefore, only the participants in Erzurum and Erzincan were questioned how much they have repaid for the loans. It was unexpected to find that none of the participants in Erzurum have made a payment in this regard. Further, they also stated that they have never been questioned by the authorities with regard to this. In fact, it has been ten years since the delivery of the houses and they were supposed to be repaid half the loan even if the half of the loans were granted with an official decree (See p: 137).

The participants mainly stated two reasons backing this situation. Firstly, most of them mentioned that they have been signed as each other's 'guarantor' to secure the loans; because of this, they have thought that if one of them have made the payments regularly –most do not pay because they do not have a regular income- then the authorities might have come to investigate the dwellers not paying; but, if all of them agreed not to make any payment, then the authorities would generalise the situation, and would not question it. Secondly, most participants stressed that their income was too small to afford to instalments along with the other essential expenses. Some mentioned that they hold green card issued by the state; and, thus, they receive various kinds of helps from the state for gratis. In Erzincan, 38 of 80 stated that they had already repaid the loans, but not according to the model defined by the state.

Instead, few times they had made large amount of payments as much as they could have saved; and, at last they were able to get the certificate of ownership. Few made half of the payments through the instalments and made a large amount of payment at once for the second half of the loan. Only two participants were found who followed monthly equal instalments, and as they said soon it will be completed. One participant stated that they repaid only one instalment and did not continue making payments at all. One participant mentioned that they made the payments not monthly, but annually.

In attempt to measure the economic impact of the earthquakes, the participants were asked to compare the level of their pre-earthquake and post-earthquake income. As the results, 22 of 80 in Van were still struggling to get back to their pre-earthquake economic status; few stated that they had already been struggling to provide sufficient income so as the earthquake had no particular impact to them, but eventually worsen their situation. Given the time passed, the participants in Erzurum and Erzincan did not mention any challenges they encountered, rather stated they got back to their usual economic status.

To better understand the economic boundaries of the participants, they have been asked to put in order the kinds of expenditures in question 75 according to their significances. As that explained above, the option of 'instalment' did not apply to the majority. Among the remaining three types of expenditures, 'kitchen' is often mentioned in the first place with reference to the large number of households. The option of 'other bills' is often referred to the expenses on their children's schooling, monthly bills for electricity, and in case they own livestock, the feeding and caring expenses of their cattle. The 'heating' was also not applicable for the most participants, particularly in Erzurum, as they stated that they have been given few coal-sacks in winter by the state because of their economic status classified under green card. As a reminder, the participants permanently migrated out of Erzincan are also 'not applicable' to this option as they only occupy their houses in summer.

In question 76, the participants were asked the type of heating they use. The results are aligned with the issue abovementioned; that is, the coal was the primary source for heating since a large number of participants, particularly in Erzurum and Van, were eligible to get this from the state as means of help. The participants in Erzincan also mostly use coal. The electricity was in the second place since most dwellers stated that they used mobile radiators to heat bedrooms and bathrooms. This also indicates that dwellers generally heat living room only as they mainly use this space, which comes from the traditional living. Using turd was mentioned

as a sole heating source by only 10 dwellers who strongly pointed their limited economic circumstances. It was generally mentioned as supplementary source of heating by the dwellers that had livestock in Erzurum and Van. The options of gas and oil were not applicable at all.

Finally, with the statement given in 78, it is sought how the participants evaluate their economic status. More than 100 of 240 participants were ‘ambivalent’ considering the challenges they encounter at balancing their income and expenses, although 81 agreed on the statement to a certain extent that they can afford all the fundamental expenses of their family with no struggling. The majority of these dwellers were in Erzincan, which overlaps with the fact that most had regular income because of their pensioner scheme. The dwellers in Erzurum and Van largely evaluated their status as ambivalent or below. This was the result in turn of the fact that the rural population in Erzurum was largely dependent upon the agriculture and the state’s assistance. The economic circumstance of the rural population in Van is rather unstable considering the trend in livelihood. That is, young population, on one side, is attracted to the urban; the old population, on the other side, feel attached to their lands. After all, earthquakes occurred are not the only reason of such adaptation in socio-economic characteristics, but they surely accelerated the process by giving them the rationales and offering opportunities in the aftermath.

6.3.2.8 Disaster awareness and perception

To understand how the dwellers’ awareness changed after experiencing earthquakes, they were asked whether they had ever attended to an informing programme. However, almost none of the dwellers in Erzurum and Erzincan had participated into such programme. Only two participants in Erzurum mentioned that they had attended to an informing session only because of their personal interests. This result approves that there was no particular programme run by the state to raise the rural dwellers’ awareness in terms of disaster preparedness and building coping skills with emergencies. The case in Van was rather different since the international civil organisation of *Caritas* had started a programme with the aim of teaching villagers how to build resistant houses complying with the requirements of construction in seismic areas⁴¹. Accordingly, although it is a small number, 17 participants found in Van who had attended to the programme; but, they also confessed that they had not paid serious attention to the topics explained regarding construction as they deemed themselves experienced already. Besides, the

⁴¹ One of the instructors, who is also an architect contributed to the damage assessment surveying in Van, was contacted in this regard in February 2013 and asked about the programme details.

programme was ceased in its early stages due to the fact that the reconstruction scheme imposed by the authorities was involving contractors. As a result, large number of dwellers in Van remained unreached by this programme.

The participants were asked how much they are afraid of earthquakes and to what extent they feel safe in their post-earthquake houses and rely on its seismic resistance. With no exception, all of the participants stated that they were still afraid of earthquakes, and even when they feel small tremors. Despite this, 75% of 240 feel safer in their house and rely on its seismic-resistance against earthquakes. The cross-tabulation revealed that the participants strongly disagreed and disagreed were only from Erzincan and Erzurum; whereas, in Van 60 of 80 participants strongly agreed. Having said that the dwellers mainly find their post-earthquake houses physically resistant to earthquakes, they often added that they believed the God had the power and ability to destroy whatever the humankind builds, which was a religious belief regarding the faith of 'fatality', and discussed in the next chapter.

6.3.2.9 Comparison between the former and the new

One-way ANOVA between-groups was conducted for the items 58, 59 and 60 to discover how the participants differently observe their current living standards, how much they have longing for their houses and how much they have the tendency to leave their current post-earthquake houses. As the results discovered, there is no significant difference for the item 59. The cross-tabulation suggests that the number of participants with strong longing was high (69 of 240), but the number of the participants with no feeling of longing was the largest (91 of 240) which makes more than one third of 240 and proportionally distributed in all cases.

The differences between the provinces were statistically significant for 58 and 60. Their cross-tabulations revealed that the dwellers in Erzurum agreed to a certain extent that their current living standards regarding the physical conditions are far better than the earlier they had. In Van and Erzincan, the majority agreed to the statement given and a small number less agreed and even strongly disagreed implying that their current living standards were no different or even worse than the earlier. Despite the statistical difference among the provinces, in real-life context it may not be considered since the effect size of the significance is as small as 0.04. The cross-tabulation of 60 revealed that 65% of the participants had no tendency of leaving their post-earthquake houses in the future. However, considering the effect size of 0.07 estimated for the statistically significant difference, it should be marked that nearly 15% are very likely to consider leaving their post-earthquake houses in future.

6.4 Summary of the questionnaire data

To summarise the demographic results, the statistical analyses revealed that the average number of households per house is 5 with the average number of three children. The age groups are quite homogenously distributed with a slightly higher share of the age group of 35-49. Considering the regional characteristics, the number of the participants with a university degree was higher than expected; while rather expectedly, the number of the participants with only a primary school degree was the highest. Regarding the livelihood categories examined, in line with the regional characteristics of the region, the share of the agriculture-dependent participants was the highest in the study, though the share of the groups of urban labour and retired nearly covered the two-thirds of the total. The vast majority of the participants became homeless and had to survive in temporary shelters as their houses collapsed or suffered heavy damage. In relation with this, temporary migration was only reported for a part of the participants from Van, while the remaining had only stayed in temporary shelters provided. The number of the houses built in a relocation site covered the two-thirds of the total, which demonstrated that the relocation was a decision highly preferred by decision-makers in Turkey. Lastly, including a very small number of participants occupying their houses only seasonally in Erzincan, the vast majority of the participants were reported as house-owner, namely, the person who actually had been delivered the post-earthquake permanent house.

To summarise the evaluation results regarding the reconstruction-related issues, the overall satisfaction of the participants with their post-earthquake permanent houses was considerably high as it remained above 4.50 on the 5-points Likert scale. However, the participants' longing for their former houses was also relatively high since it remained 2.50 on the scale, even though the higher number of the participants strongly disagreed. In terms of comparing the pre-earthquake and post-earthquake physical conditions, the participants' satisfaction was also high, but remained below than their overall satisfaction, which implied that their expectations regarding the post-earthquake permanent houses were not fully met. Particularly the size and plan of the houses and the quality of the structural as well as the interior material used played a role in relation with this. The quality of the houses also played a role in the evaluation of the worthiness of the houses. In detail, the participants in Erzurum were highly dissatisfied with the quality of their houses, whereas in Van, the use of steel as the construction material raised concerns among the dwellers since they were not familiar with it. The use of barn units was in line with the dependency on agriculture. That is, it was highly significant in Van, while in Erzincan since the dependency on agriculture was the lowest of the three case studies, the

number of the participants using their barns was the lowest as well. Accordingly, the participants who did not need barn, as they did not own cattle, either transformed it into an extension of their residence, the case mostly applicable to Erzurum, or kept using as storage. Generally, the house loans were found overestimated by the participants as they found unsatisfactory the work and the workmanship completed by the contractors. With this in mind, the following interview data bring more in-depth understanding directly from the participants' words as part of the qualitative data analyses of the study.

6.5 The interviews and the analytical themes

The interviews were conducted to bring further details addressing the core of the study. Accordingly, the transcriptions from the interviews are abstracted in association with the themes of migration, livelihood, evaluation of the reconstruction approach as well as the post-occupancy evaluations to reflect the dwellers' perspectives directly. The interviews lasted for 3-5 minutes in average.

Given the fact that the dwellers in Van had a recent experience of earthquake and homelessness in the aftermath, the participants were highly eager to word their experiences. Hence, the number of the participants gave consent to interviewing was the highest among three case studies. They are enumerated from 1 to 21. Since the earthquake took place and the experiences of the participants were a decade ago, the participants from Erzurum were less interested in speaking out their experiences than the participants in Van. That is, some hardly recalled the time of the disaster in detail. Besides, the village community of Erzurum was far shy and more conservative than the village community in Van, which also affected the number of the interviewees. The interviewees from Erzurum are enumerated from 22 to 34.

Nevertheless, the interview attempts were not accomplished in Erzincan, which may be given the change in the socio-economic pattern and the time passed after the earthquake. Only a middle-aged married couple was interviewed, though the interview was not fruitful since the conditions of the interviewees were quite different than the participants in Van and Erzurum. That is, their house was also a post-earthquake permanent housing project, but was built under a donation of a foreign country. Despite the fact, it provided a very small contribution to the interview data.

The interviews generally took place either in front yard or terrace of the participant's house, or on the exterior stairs of the house if it was two-story. The interviewees were mostly married

couples, house-owner companied either by their neighbours came to guest at the time of the interview, or by other family members, e.g. daughter and son's bride. To say, rather than conducting one-to-one exclusive interviews, it was aimed to communicate with participants in an informal environment as possibly as so that they would not have felt under pressure of conducting a highly private conversation. In doing so, it was aimed to make them felt as comfortable as they conduct their conversations with their neighbours in daily life. This approach provided more sincere and casual ambiance for the interviews considering the social environment in the rural.

6.5.1 Migration

In the cross-case analyses, temporary migration came up as an issue specific to Van, which the highest number of participants had temporarily migrated out of the disaster area. This is only a small reflection the study captured within the massive flow leaving Van as a result of serious damage both in rural and urban areas that widely disrupted people's daily life. The unusual migration flow took the attention of the media as well (e.g. Yüksekovahaber.com, 2011; Haber318.net, 2011; Denizlihaber, 2011; Diyadin.net, 2011), and the official statistics revealed the growth in the numbers compared to the previous years (Table 6.56). The steady flow into and out of Van between 2007 and 2010 were doubled with the impact of the disaster. Considering the earthquakes stroke in October and November respectively, such massive flow happened just within the final quarter of 2011. The flow continued decreasingly in the following year, and this time there was also a large volume of migration flow into Van.

Table 6.56 The migration flow into and out of Van between 2007 and 2013 (TSI, 2014).

	Volume of Migration* in Van (Turkey)	
	IN	OUT
2007-2008	21.128	30.275
2008-2009	22.866	27.175
2009-2010	23.213	31.312
2010-2011	23.415	72.273
2011-2012	50.003	46.639
2012-2013	32.118	38.507

(*) Indicates the census data based on the address records.

This can be explained by two factors. Firstly, given the conditions in the aftermath of the earthquakes, heavy snow and frosty cold season of the year for the region, shortage of shelter and increasing security problems, some chose to leave Van temporarily by their own decisions, and others were temporarily dislocated by the state to accommodate in guest houses in other cities of Turkey. Secondly, the housing reconstruction was started immediately in some

locations of Van, and the houses completed were delivered to the beneficiaries by the end of 2012. Thus, a considerable number of affected dwellers started to return to Van to settle in their newly built houses. Among 21 interviewees from Van, 6 had temporarily migrated, and when they were asked to elaborate their experiences regarding difficulties they encountered, they commonly highlighted the amounts of rents they had to pay, the insufficient size of the flats they stayed since they shared the flat with their relatives and the hardship of surviving in a stranger place to them. For example, of the interviewees #17 and #18, who were two relative families and migrated together into Batman, a province in the region of Southeastern Anatolia, the interviewee #17 explained:

“We left Van one month after the earthquake. A lot of money we spent. I had to sell my golden bracelets to make more. We had no relatives there. (Batman) was a very strange place to us. We went 7-8 families together and rented flats of TOKI in the city centre (the multi-story apartment buildings), but two families stayed in each flat rented. We paid 300TL as rent, but the flats were too small”.

Also Mersin, a province in the region of Mediterranean Sea, was a stop chosen by three interviewees (#8, #9 and #10) for temporary migration and whose statement mostly overlapped with the above as the interviewee #8 said that they paid 5000TL to rent a small flat for a year. Besides, the interviewee #10 stated that they needed to start to work in a construction site to provide an income as they had run out of their own sources.

In a unique case, temporary migration led a different story as that happened to the interviewee #20, who met her husband after his family migrated into Batman. She highlighted the hardship took over Van in the aftermath of the earthquakes and stressed that the family of her husband needed to migrate since there were children had to continue to school and the schools in Van had collapsed.

The remaining interviewees in Van had not migrated and continued living in the tents and containers provided by the state until they had been delivered their houses. This was either because they preferred so, or they had wished to migrate but could not have made it due to their own circumstances. In detail, they strongly emphasised their allegiance to their lands and living styles, as well as their large households and livestock. In relation with the latter reason, the interviewee #15, who was the interviewee with the largest livestock composed of 150 animals (both sheep and cattle), complained his desperateness since he was neither able to find a buyer for his livestock, nor able to leave them following the earthquake.

In relation with the first reason, for example, the interviewee #6 stated that although she had experienced the worse – their container had been flooded due to heavy rain in the following

days of the earthquake- she had never considered leaving her village as she clearly said that she could not have lived anywhere else. Here, the emphasis was on the place attachment and the lack of adaptation, which was simply pointed by the interviewee #4, “One who lives here cannot go away!”, and explicitly worded by the interviewee #3 as they elucidated their previous experience:

“We did not migrate after the disaster. We never thought about it. We have been in Istanbul for about 3-4 years, but the world there and here are totally different. It is a chaos every day (in Istanbul). If you do not work even for one day, then you would starve. We could not adapt, we have kids and we are a large household”.

As the examples revealed, migration was a challenge for the survivors as they strongly express their dependency on their lands as well as the cultural and life style differences between the east and the west of the country, which was a barrier even in their state of mind. In this regard, Istanbul has a reputation that one can hardly survive to make a life⁴². Nevertheless, like the husband of the interviewee #12, who had left to Istanbul after resettling in their post-earthquake permanent house, some still make attempt in seeking better income. After all, living in flats in multi-story apartments was apparently uneasy for large households, and the rents that exceeded their financial capacity were a big challenge for these people.

Unlike Van, none of the participants in Erzurum and Erzincan had migrated out following the earthquake. They had stayed in their temporary shelter units until they had been delivered their permanent houses. Four interviewees (#29, #31, #32 and #33) stated that they had no chance other than staying in the tents provided by the state. According to their words, the completion and delivery of their houses took nearly one year. As a strategy adopted based on the regional weather conditions, the interviewee #30 stated that they stayed in the tents during the summer, but when it was turning to the autumn, they moved to the city centre of Erzurum and rented a flat in an apartment. The interviewee #29 confirmed that some dwellers in their village stayed in the tents during summer, and moved into their damaged houses to pass the winter.

The size of tents was insufficient for large households as the interviewee #34 stated that they could not have stayed in the tent for long, and had built a one-room sized shed nearby their collapsed house, and lived there for about 2-3 months until their post-earthquake house was completed. The interviewee #25 also stated that they had stayed in their damaged, but partially standing, house for a while since the construction of their house was delayed.

⁴² Having said that, the data of TSI reveals that in the periods of 2010-2011, more than 18 thousands had migrated into Istanbul from Van, which was apparently because of the disaster considering the number of the previous period (2009-2010), 8 thousands.

6.5.2 Livelihood

Given the regional rural characteristics, livelihood mainly refers to animal breeding. Despite the fact, most of the interviewees emphasised that animal breeding was no longer favorable as livelihood since they exemplified a variety in source of income, which also portrayed the changing trend in the region. In this context, the interviewee #15 with a large livestock and the interviewee #23 with a large farming land highlighted the lack of factory and business investment in the region which inevitably limited their livelihood options. The interviewee #7, a university student who was one of the workers in the construction of the permanent houses, and the interviewee #26 pointed the vulnerability of the livestock dependency as they had lost their stock under debris. Nevertheless, in some cases, e.g., the interviewees #32, #33 and #34, having livestock saved the survivors as they were able to sell them so that they had supplied their immediate needs to some extent.

To explain the sources of income preferred over agriculture, construction sector is in the first place that rural people prefer to find jobs, and is followed by various service jobs such as driver, security and cleaning staff. Having said, they also prefer to keep a very small size of livestock only to supply their needs. For example, the husband of the interviewee #6 and the father of the interviewee #5 earn around 30TL per day by running a car park, but both have a small hencoop. The interviewee #8 is a full-time cleaning staff in a school and works from 8 am to 9 pm every week day, and still keeps a couple of cattle for their needs. The interviewee #12, whose husband was away to Istanbul to find a job, stated that an additional income would still not be enough to supply their basic needs if they did not have their three cattle and few chickens. More explicitly by the words of the interviewee #22, keeping such very small size of livestock was supplemental to provide free milk, butter and meat enough to family as he said he already had a job with a decent salary. Here, the emphasis is on the regularity of income. In relation to this, the interviewee #27, who is dependent on agriculture, raised his worry about the approaching time of the children's school, for which he needed savings to afford registrations, stationary and so on, and also pointed the drought stroke in the past years. In making a comparison, the interviewee #28 pointed the significance of 'stability' in income:

"Of course, I would prefer an occupation other than animal husbandry. In this way, we do not have a stable livelihood. It is not clear how much we earn, how much we spend. On the other side, either in the state or private sector, it is very clear what you can earn and spend".

Not only that, the interviewees prefer other sources of income than agriculture because the health and pensioner insurances they provide. The interviewee #10 clearly underlined the

significance of insurance as he referred to it as a 'secured job'. The interviewee #30, a housewife, expressed that she would have preferred her husband worked in a job with a regular income and insurance as she also stated that they had already left agricultural activities so as they were solely dependent on the help from the state. The couple interviewed #35 in Erzincan also stated that they had their pensioner salaries as both were retired. From a different perspective, the interviewee #20, a finance-graduate working in a bank and whose husband is a nurse at the local hospital, pointed the generation factor in the continuity of agriculture:

"Maybe my parents and my husband's parents think to continue animal breeding, but we do not, and I do not think anyone from the young generation would either".

The example of the interviewee #21 is also similar as she said that her husband's parents had animals, and since they are a large family, the amount left to them is often too low to consider as a source of income. Hence, her husband works in a different sector. The interviewee #11 stated that he worked in construction sector for a period of time, and was earning much more than he made from animal breeding. The interviewee #18 stated that her husband had already been a truck driver before the earthquakes, and they did not think to go back to animal breeding at all. The interviewee #19, whose few cattle had died under debris, had owned properties in rent which, as they thought, was better income than that of their livestock.

In contrast, the interviewee #3, a construction worker, criticised the sector since he was not able to have his payments on time, sometimes in weeks sometimes in months, which still kept his income instable in his words. The interviewee #9, who had worked in various construction works and also in the iron and steel manufacturing in the late 1970s, stated that not all of his employers paid his insurance regularly, but somehow he had paid it to have the pensioner salary. By the time of the interview, he had his medium-size livestock in a temporary tent built by the state. Similarly, the interviewee #13 strongly criticised the employment process of the state as he was looking for a stable job after the disaster, but was not able to find one. Eventually, he stated his wish to continue animal husbandry:

"After the earthquake, we sought jobs through ISKUR (The official state agency that provides public employment service). It was all about having a 'back' in ISKUR. They were hiring their men, only the people they knew. For instance, I had no attachment with them before the earthquake, and despite being a graduate from high school, they did not hire me. I wrote 2-3 letters about this issue, but nothing changed. The construction sector was disrupted and animal husbandry was already about to end. Hunger was a big problem at the time. Now I have a job in a construction work, but I want to get back to animal husbandry".

Differently, even though the interviewee #4 preferred working in the construction sector, he pointed out the regional weather conditions, particularly in Van, causing challenges to continue working throughout the year, but only for half a year, which inherently affected the regularity

of the income. The interviewee #24 stressed that he preferred animal husbandry over being a state officer since he was able to save more, and at the time of the interview he was having built a second barn for his large livestock. He also emphasised that he was able to have the pensioner salary as he had paid for himself in the insurance scheme of the state.

Overall, the examples uncovered that the popularity of agriculture as livelihood is descending particularly among the young generations. However, this does not appear as the direct result of the disasters. Rather, this trend is ascending with the influence of other socio-economic factors. Particularly, the urban attracts young rural people who have completed higher education and who has skills to be employed in an office job, which pushes the issue of migration on the other side. For example, the interviewee #31, a father of three, implied that he would expect his children to stay in the village only if they do not wish to continue studying or fail at school. As an elder person living alone, the interviewee #29 stated that her sons had already left the village to establish their lives, which highlights the attractiveness of the urban in general:

“My older son was already based in the city centre of Erzurum. The younger one, however, looked for a job for a long period of time. Eventually, he could not find any and went to Mugla (a province in the Aegean Region in the west Turkey) with his friend and opened a café. I am left alone over here”.

This attractiveness is also the result of regular income that the most urban jobs offer, which is unlike what agriculture offer⁴³. Besides, considering the cost and effort required for animal breeding, some families have chosen to adapt their source of income as some of the interviewees in this study. However, following the 2011 earthquakes, the state developed recovery plans not only for housing, but also for livelihood in order to reinvigorate animal husbandry in the region. To this end, a new regulation was enacted on 14th December 2011 regarding the recovery of the livestock loss of the people affected in Van⁴⁴. Accordingly, owners were granted 400TL for each cattle and 60TL for each sheep they had. Nearly 3650 temporary barns were built apart from the permanent reconstruction scheme. According to a local non-governmental authority, the recovery plan worked for Van since it had the largest sheep stock of the country as of 2013 (Van Valiliği, 2011; ILKHA, 2014). Nonetheless, it should be noted that none of the interviewees and survey participants stated that they had benefitted from this recovery scheme.

⁴³ In details, by the year of 2000, a rural labour could only make 26.9% of what an urban labour could make, according to an official report (SPO, 2000a, p. 19). With regard to animal husbandry, despite the whole region slightly increased its share in the gross agricultural value of the country, the share of Van had shown a radical drop from 53.1% to 43.6% by the year of 1990. In another comparative study, the agricultural characteristics of Van was categorised as average and its rural attractiveness as low (Gulumser et al., 2007), which explains the trend from another perspective.

⁴⁴ The decree numbered 2011/2511 by the Cabinet of Ministers, available at: <http://www.resmigazete.gov.tr/eskiler/2011/12/20111214-1-2.htm>.

6.5.3 Reconstruction approach

An array of issues encompassing the house loan model, the process of identification of beneficiaries, the involvement of contractors and the preference of owner-built approach in construction process was investigated through the interviews. To begin with the house loan model, some interviewees in Van stated their worries about whether they could afford to repay the instalments or not, besides stating the unclear payment model that raised questions in their minds. For example, the interviewee #3 and #5 implied that they would not be able to pay the monthly instalments on a regular basis by pointing the irregularity and deficiency of their income. Highlighting both issues together, the interviewee #4 explained the model he desired instead of the existing loan scheme:

“It is very good that the state built houses for these people. Let me say, for example, a daily worker, works for 40TL per day, but he may find jobs for 3 days, and may not for 5 days. How that person could have built a house like that? Even if he works for 30 years, he cannot. But, at the same time, it is bad, because the state traded these houses to people under the name of AFAD. They should have said that a house like that costs them 40-45,000TL via a contractor. Then, they should have granted the half of it, while asking the other half to be paid by the owners. I would prefer it such way; but, they say they provide the loan with an index of state salary, and the villagers will pay this in 20 years. We do not know how much they are going to get back in 20 years. Is it 44,000, 84,000 or 104,000TL? It is not clear”.

Talking about the implementations in Van, in different sources the details of two payment models regarding the urban and rural areas were found. The beneficiaries in urban areas were allocated 75,000TL as the total amount of the house loan. This amount was interest-free and to be repaid in 20 years. The first two years are suspended and throughout the following 20 years 280TL monthly instalments to-be repaid by the beneficiaries (Anonymous, 2012). In another resource, it has been reported that the real cost of an urban house built by TOKI, with a size of 100 m² was 110,000TL, but since they subsidised 30% of this amount and spread the payments in such long time, the real amount that the beneficiaries will pay to be around 28,000TL taking into account the annual inflation effect (AA, 2012). The beneficiaries in rural areas were allocated 40,000TL for the construction of their houses (in the second year of the disaster the amount was increased by 10%). The interest and payment conditions were same and the amount of the monthly instalments was 170TL (G.o.V, 2012), which does not include the loan for barn unit. However, none of the interviewees or the participants in Van seemed informed enough about the details of the repayment. Controversially, another source argued that the state agencies (AFAD and TOKI) sold the houses with a profit if taking into account the actual cost of construction per m², which was defined 560TL by the state in 2012. Thereby, a 100 m² residence in a multi-story apartment with a lift makes 56,000TL (ETHA, 2012).

This estimation draws a gap between the numbers declared by the state and the estimated cost of the houses, which was not the case only for urban areas, but also for the rural areas in Van. This may explain why some of the interviewees highly stressed that the house loans allocated for the post-earthquake permanent houses were exaggerated by the state and exceeded the real cost of the houses in their opinion. For example, the interviewee #27 from Erzurum said:

“I would definitely say that I wished I, myself, had built the house. I mean, they valued these houses about 54-56,000TL. I would have added 10,000TL to the amount and easily could have bought a flat right in the city centre of Erzurum. I would not have stayed here”.

In relation to the amount of the loan allocated, some (e.g., the interviewees #3, #6, #22 and #31) strongly opposed to the involvement of the contractors, as they implied that they could have built better houses with the same amount of loan, i.e. in a larger size with a layout they desired and in better quality. The interviewee #13 better elaborated the issue as he stated:

“I could have built my house on my own, at the same value. Wish the villagers have been taught about it. At the same amount of money, a 120 m² house could have been built instead of 100 m². Besides, they increased the loan to 44,000TL from 40,000TL. It could have been very easily a larger house with better (finishing) materials. For example, the loan for barns was 17,000TL. I built it myself, a 40 m long barn. It had a cost of 11,000TL to me. Furthermore, they (the contractor) were supposed to build wire fences around the houses, but they did not do it without informing us.”

Besides, some emphasised that the contractors had involved because of the profit they could have made by replacing materials improperly. For example, the interviewee #3, who was experienced in construction and also built a house for his parents, explained that a contractor could easily make a profit of 10-15,000TL per house in their situation, which was the reason why the contractors were attracted in his opinion. The interviewee #16 clearly stated that the contractors ignored the villagers through the paperwork entitling them as the procurator to take the loan directly from the state in taking advantage of the situation.

The interviews also discovered that having the knowledge and experience of construction makes the dwellers more critical in the evaluation of the process. For example, the interviewee #14, who emphasised his lack of trust to the contractors, exemplified the use of poor quality of concrete and insufficient steel bars in the structural system. Similarly, the interviewees #10 and #16, who had experience of 8-9 years in the construction sector, referred to the poor quality of material used in the structural system and they implied the lack of control mechanism over the contractors as the reason for this. The way the contractors worked was also strongly criticised by some interviewees. For example, in some villages the contractors hired had brought their own workers along. The interviewee #15 explained why they criticised this issue:

“We, all the villagers, worked in the construction of our houses. We had all the men required. No stranger, outsider worked for our houses. I have checked once one of the villages to be built by a contractor from Diyarbakır. The foundation plan of the houses has normally continuous beams with 20 cm width and 40 cm height. There are condensed steel bar section, in which the distance between two bars decreases to 8-12 cm. They built it as regular, with 20 cm distance between. I estimated the required volume of concrete to pour for a house; it should be around 60 m³. They built it up with only 42-43 m³. There were no worker from the village, all were brought from Diyarbakır”.

Similarly, the interviewee #14 also explained how they prevented the misuse of the loans and took the lead in the construction of their houses:

“We worked in the construction of the houses. We brought the concrete and steel bars required. Thus, the contractor was not able to use improper materials, at least in the structure itself. They could only have made profit from doors, windows, paints or plaster if they used poor quality. My father is the reeve of the village at the same time. So we did not allow them to misuse the loans. Then, the contractor left in the half way of the construction, we finished the houses”.

In some villages, due to the number of the houses required to be built more than one contractor involved. In such cases, while some dwellers highly appreciated as they received their houses on time and in a completed condition, some were quite underappreciated as they did not like the quality of the work done and were still waiting for the delivery of their houses, e.g., the interviewee #14. Few interviewees (#1 and #3) even stated that they would build a new house as soon as they could afford. From a different viewpoint, the interviewee #15 said that they would add a second story on their single story house.

The interviewees with no construction knowledge or experience mostly stated their appreciation with the construction process as they commonly highlighted that they could not have managed their budget if they had built the houses by themselves, e.g., the interviewee #2, a farmer. The interviewee #7, with few cattle and does farming, referred to their severely limited economic circumstances as they said that they could have never built a house like they were delivered. The interviewee #8, a cleaning staff at a school, stated similarly although they had a regular income. Referring to their lacking skills, the interviewees #9, #11 and #12 stated that building the houses by the contractors hired was advantageous, rapid and turned out better than they had expected. The interviewee #30 stated that her husband was not a person that could build the house on his own. Thus, they were satisfied with the house in general and particularly with the construction material used since they no longer wished to live in an earthen or stone masonry house. The interviewees #24 and #28 expressed their satisfaction with the houses by referring to the same issues, and the interviewee #34 pointed the robustness of concrete as material. As one of the construction workers, the interviewee #4 explained why hiring contractors should be viewed better in terms of managing the loan:

“We built this house in almost 40 days. We have delivered nearly 40 houses in this village; almost each of them took a month. There are people saying that they would have built by themselves. There are people already doing that, but they would encounter struggles. By struggles I mean, for example, we are able to complete all of the structural system of a house like this, including its plaster and roof, at a cost of 10,000TL, but when they build on their own, they cannot even complete such work at a cost of 15,000TL. We agree a skilled man at the price of 40 houses, but when he works for a single house, he would not work at the same price.”

He continued to explain by taking the example of his uncle's son's house, which was under construction at the time of the interview:

“The villagers want such houses, from concrete. But most cannot afford. For example, we are building this house for my uncle's son. This house now costs 55-56,000TL. Plus, he paid in extra for the kitchen, for wooden floor coverings. So, when you calculate all, it makes 60,000TL. Then, to afford such house, he must sell 30 cattle. I mean, if it was not provided in instalments, it is impossible for him to afford it”.

Regarding the preference of the structural material, of five interviewees from the villages that TOKI developed as a pilot project of light-steel frame houses, only the interviewee #18, whose former house was an earthen structure, and the interviewee #21, whose former house was a concrete structure and heavily damaged by the earthquake, were satisfied with the light-steel frame houses built as they stressed the ‘robustness’ of the structure. The pilot project of TOKI in two villages was almost the first introduction of steel frame as a kind of structural system in the region which demonstrated local people that it could also be used in residential buildings. Nevertheless, most of the dwellers in these villages were not happy with this kind of implementation. For example, the interviewee #17 stated that she was happy with the house in general as well as its relocation site since the former site was a flood-prone area. But, she kept on telling the latter changes in the process, which basically allowed few villagers to have their houses built as RC frame structure and in their former land since they had insisted by writing several letters to the authorities. The interviewees #19 and #20 similarly emphasised their preference of concrete over steel and criticising the relocation plan as both stated their will to build a new house in the former place.

Preferring concrete as material over steel or other locally available materials can be linked to the domination of concrete in the construction sector of Turkey for a long period of time, and people's cognition that the material can be applied even in poor conditions and by unskilled men, though it is doubtlessly not true. Among the interviewees, only the interviewee #25 implied that they would have preferred a traditional village house built with local materials instead of the type of the post-earthquake houses built as he also added that heating an earthen house was easier.

In the reconstruction process, the identification of beneficiaries was one of the stages that turned out problematic for some villagers. For example, the interviewee #16 told his experience as he encountered problems in his land records:

“After one or two months of the earthquake, they (the officers) came for the identification (of dwellers) and determination (of house locations). They asked us to bring all the documents, the land records, dwelling registrations etc. We gave them. The dwellers that had no unclear issues in the records were identified as beneficiaries in the first place. They were said to be received their houses in the following year. But we, who encountered problems in the records, were said to solve the issues first, and then were to be received the houses this year, the second year of the earthquake”.

The interviewee #13 highlighted how the reeve of their village put effort to allocate separate houses for the newly-wed young couples in the village, but the authorities blocked the process. Similarly, the interviewee #14, who had to live in his damaged but still standing house with his nine children, was not identified as beneficiary since he used to live together with his father, the reeve of the village. He stated that living in a damaged house was psychologically difficult and explained how the process had become byzantine:

“We have lived in this (damaged) house before the earthquake. Normally, we had the right of both house and barn. But then, I do not know what happened. The right of barn was checked, but the house was not. The officers came here, said to me that I lived with my father, so they listed his name, not mine. Then, he got the right of barn, but not the house. Two months after the earthquake, I left my father. Now I have to live here. I wrote, maybe, 20 letters about it, talked to the governor in person. They said they were going to come back to check the house damaged”.

In Erzurum and Erzincan, the completion of the post-earthquake houses took less than one year considering both earthquakes stroke in March and the dwellers were delivered the houses around December of the same year. Similar to the observation in Van, a number of participants mentioned that they would have preferred to build the houses by themselves, so that the houses would have been more as they wished. As one of them, the interviewee #22 stated that the amount of the loan allocated at the time (43,000TL) was enough to build a better house and they still had the wish to, but their economic circumstance would not allow them today.

In some villages, as the interviewee #28 explained the case in his village, few dwellers had attempted to build the house on their own, but then they had to hire a contractor, which caused delays in the construction and differences in the quality of the work and workmanship of the houses delivered. For example, in relation to the first issue, the interviewee #23 stated that they had to move in the house when the doors were still required to be fixed. The interviewee #33 detailed the latter issue as she pointed the poor quality of the interior finishing materials used, e.g., the tiles for the bathroom and leaking ceiling after rain. The interviewee #32 complained

the poor workmanship of the walls beside the lacking insulation between the double walls of the house. The interviewee #29 highlighted the issue of the use of improper material for furnishing inside of the house, and stated that they were afraid of the cracks appeared on the walls even though they thought the house was structurally of good quality. Regarding the poor quality of the construction, the interviewee referred to the irresponsibleness of their reeve as he stated that the reeve had neither controlled the construction on site nor the contractors.

Specific to the houses implemented in Erzurum, some interviewees criticised the house plans as one of the typical plans had a barn in ground floor and the residence was on the first floor. As one of the dwellers in two-story houses, the interviewee #25 stated that she would have preferred their house as a single story with a separate barn nearby. Besides, she stated that they could have built a better and larger house with the same amount of loan. Particularly, the exterior stairs of two-story houses were underappreciated by the dwellers as they found it inappropriate for the regional weather conditions and complained the lacking quality in the construction. The interviewees #32 and #33 stated that the stairs needed to be repaired, e.g., plastering and replacing the tiles with new ones, almost every year. In contrast to the dwellers unhappy with two-story houses, the interviewee #28, who is a resident in a two-story house as well, differently stated that they were happy with the house since they were able to see all around the house as such a kind of scenery.

Ultimately, the decision of relocation was necessarily made for some villages, either to vacate a flood-prone area (as to the interviewee #28) or to recreate larger plots for the dwellers (as to the interviewee #27). However, some were against the relocation of their village, like the interviewee #31 who stated that he would have built their house in the exactly same place if only they were handed in the loan directly. To sum up, the opinions of the interviewees in Erzurum and Van did not differ considering the dichotomy in the preference of having the house built by contractor or by themselves. Most were happy with living in a RC frame house instead of living in an earthen building. Nevertheless, they commonly complained about the lacking quality, from the structural material to the finishing material. The quality differences between the buildings completed by different contractors were also one of the issues raised by the interviewers. As a special note about the interviewee #35 in Erzincan, their house was a donation by a foreign country and they had never involved in the house loan scheme of the state. According to their words, the reconstruction process had been controlled strictly and they had seen the foundations built under the house, which made them feel fearless of earthquakes.

6.5.4 *Post-occupancy evaluation*

Although the implementations aim to reduce the vulnerability of the built environment, as explained in Chapter 5, they are prototype projects with limited options varying in size and layouts. In this regard, a part of the interview questions aimed to explore to what extent the houses had met the expectations of the dwellers since their occupancy. First of all, regarding the size of the house and rooms, the interviewee #2 stated that the only thing he could say was he wished the house was a bit larger. Besides, he also stated that the size of the living room, which is 6x6.5 m, is indeed quite ‘good’. The interviewee #7 stated that he found the size of the house small as well, but added that this was with regard to the number of their children. Similarly, the interviewee #11 mentioned the smallness of the house as he added that they were two families with 15 households living together, and some inevitably had to sleep in the living room over the nights. Contrarily, the interviewee #18 stressed that the size of the house was not a big deal since one could find ways to sort it out, rather the ‘robustness’ of the houses was more important in their perspective.

Regarding the plan of the houses, the interviewee #6 stated that she would prefer a separation wall between the living room and the entrance door, which was an open-space plan (See p: 142), as that would provide more privacy. The interviewee #3, whose husband had built a 220 m² house for his parents by himself, explained that they had desired a house plan with a basement:

“There was a previous project with a basement floor with 2.10 m height, a very beautiful plan. They cancelled it, change it. Besides, the villagers, who started to build their house this year, have built the houses as 130-140 m² instead of 100 m². Plus, they still have an amount remained from the loan”.

About the roof plans, the interviewee #10 stated that the rafters under the roof had been put sparsely and no insulation had been placed, while the interviewee #13 referred to the ineffective slope of the roof, which was not high enough to push the snow to slip down. Referring to the similar issue, the interviewee #21 stated that the height of the ground floor was nearly at the same level with the base which was inappropriate to block the rain or snow.

The interviewees from the villages of Özkaynak and Topaktaş displayed higher satisfaction with the quality of interior finishing materials of the houses than the interviewees from the other villages, since they were delivered fully refurbished houses. They commonly referred to the smallness of the windows and the easiness of heating and cleaning inside the house. The interviewee #19 highly stressed that she liked the bathroom the most in the house. Only the interviewees #20 and 21 respectively issued that they found the workbench in the kitchen and

the room doors of poor quality. As both villages were relocated, while the interviewees #17 and #21 were quite happy with the relocation site as they referred to the new site as ‘silent’ and ‘peaceful’, the interviewees #19 and #20 highly stressed their low satisfaction with the settlement layout in the relocation site as the land had been misused according to their opinion. Particularly, the interviewee #20 issued that the direction of the houses, of which entrances look each other’s with only a village road between, was inappropriate in terms of decreasing the sense of privacy.

The interviewees, whose houses had been constructed by the contractors involved due to the conditions of loan allocations of AFAD, were highly unsatisfied since most had been left alone to complete the interior finishing by themselves (e.g. floor covering, cupboards and workbench in kitchen), which meant extra cost for them. For example, the interviewee #16, who had experience of construction, exemplified that in the project the wallpaint was silicon-based but the contractor applied simple plastic paint. He also pointed the concrete floor left plain with no pavement. He added also he was afraid of using the sockets as he said that he had heard from his neighbour that once he had used it to turn the television on, the socket had melted due to overheating. The interviewee #13 complained that there were already cracks across some of the walls inside the house, and he also added that giving to the 44,000TL loans far better houses with better quality of materials could have easily been built in his opinion. The interviewee #12 stated that they completed the kitchen and changed the main door as it was very poor. Due to their limited economic circumstances, they covered the concrete floor surfaces of the rooms with large carpets including the kitchen. Similarly, the interviewee #10 said that it would have been better if the wooden floor covering were paved by the contractor, as they covered the floors with carpets as well. He continued explaining that the contractor should have placed the workbench in the kitchen according to the first plan, but they had removed it later as they did not even complete the tiles. By showing the verandah, he stated that the contractor even attempted to build it smaller. In addition to the same points, the interviewee #6 highlighted that the inappropriateness of the pipe system which was same for the shower, sink and the kitchen and because of this, it was frequently blocked.

The interviewee #5, a university student, stated that they still had to pave the wooden floor covering and the tiles for the kitchen and the bathroom, which had drawn them to feel regret because of involving contractors in the construction work. The complaints of the interviewees #1 and #3 largely overlapped with the others’ given in this page, though the interviewee #1 was delivered her house with completed pavements.

It is not wrong to say that the complaints raised similar issues not unexpectedly since most were strongly against the approach adopted for the post-earthquake reconstruction process. Besides, the more knowledge they have about the construction, the more critical they become against the work completed as that highlighted earlier. However, this is not to mention that the implementations are actually poor since the experienced dwellers think so. Rather, it is to prove that different people with different background and capabilities have their own perspectives and eventually put their own criteria when evaluating the implementations. In this sense, the interviews were enormously enlightening the diversity in the perspective of the rural dwellers.

Since they had longer period of occupancy and had been delivered houses with different layouts, the interviewees in Erzurum raised different issues. For example, with regard to the plan of the houses, few interviewees particularly highlighted that having the bathroom and toilet within the house was much better (e.g., the interviewees #25 and #29), which are separately built outside the house according to the traditional housing plan. Nevertheless, the house plans with two-story was challenging for some, particularly for the elder people. In further, while the interviewee #22 was in contrast, the interviewees #29 and #30 stressed the heating problem and the interviewee #29, an elder person, elaborated the issue as follows:

“In my opinion, the house is good. Toilet and bathroom are inside the house. All is good. It is also good during summer time, but in winter it is also so bad that it is impossible to heat inside. The bathroom remains cold all the time. You fire on the stove, but not enough, because the bathroom is too large to heat. What I did last winter was I did not buy any coal and I went to my daughter’s house, which is in the city centre of Erzurum. I stayed there until winter passed. I mean, I was often going there when I needed to take shower and coming back to here for only few days. What else could I have done? It was totally impossible to heat inside and I was freezing as I am already an old and sick person. When I was staying here, I tried to fire turd to heat since I was not able to buy wood or coal”.

In relation with the leaking roof, the interviewees mentioned the terra-cotta roof tiles as the reason for. Thus, replacing the roof tiles with aluminium-galvanised plates became the most preferred alteration to overcome the issue. For example, the interviewee #33 also stated that they were going to change the roof tiles in one year. The interviewee #32, one of the dwellers who already replaced the roof tiles because they were tired of suffering leaking roof every time it rains, pointed the issue that the roof tiles were not appropriate for the area as they were cracked by the cold weather (shrinking due to the snow turning into ice) and its workmanship was also lacking.

With regard to the relocation, some interviewees severely complained. As one of them, the interviewee #31 clarified how the village was relocated and how he struggles between both locations:

“There are almost 10 families currently living up there. The officers, the engineers have come and checked all of the houses at the time, and they reported the houses of these families as ‘no damage’. Thus, they were not identified as beneficiaries. This was how it happened. At the beginning, the villagers wanted to move to this area; but, when they saw the type of the houses and the plan of the settlement, they changed their minds because they were not happy with it. But, it was too late. I am also one of those that go daily to the former village, because I have a barn and my own garage up there. It is at 1.5 km distance. There is no possibility for me to build new ones in here, in fact, why would I do if I already had there? I have three kids to supply their schooling expenses”.

Similarly, as a beneficiary who had been allocated a single story house since they were not identified for the allocation of a barn, the interviewee #34 complained that every day they had to go to their barn in the former settlement, which was in 15-minute drive distance from the relocated settlement. They also explained that the road got sometimes closed by the heavy snow in winter, and the villagers that had livestock often take their animals to the pasturelands around the former settlement as well. When they were asked whether they had tried to talk to any authority to explain the situation, the interviewee, a housewife, raised another issue regarding the gender inequality.

Some interviewees strongly emphasised the inappropriateness of the relocated settlement for animal husbandry. The interviewee #33, as one of them, stated that the former location of their village was better as it was surrounded by the pasturelands. Besides, they also said that the location nearby the road was dangerous for their animals as well as for the drivers, which is similar to what the interviewee #31 stated. Relating the issue with the house plans, the interviewee highlighted that the residence planned in the first floor was strongly exposed to wind that the inside of the house got easily cold. The interviewee #30 supported this opinion besides stating the residence was also exposed to the smell, hence they removed their animals to another building and left the ground floor empty to avoid smell. The interviewees #28 and #29, similarly, preferred not to use the barn in the ground floor to avoid the smell problem, #29 stated they preferred keeping their small number of livestock in the former settlement. Besides, the interviewee stressed that the relocation site was prone to remain under snow. Despite the fact, the interviewee said that they were happy with the number of the bedrooms as they had more available space for their households:

“The size of the rooms is small, but, we had only two bedrooms in our collapsed house. In one bedroom, I and my husband were sleeping, and in the other, my husband’s mother was sleeping. Now, there are three bedrooms, so in one room we sleep, in the second room my husband’s mother sleeps, and in the third room our children sleep. I mean the rooms are small, but functionally good”.

In contrast to the opinions on the relocation, the interviewee also expressed that they were very appreciated for being relocated nearby the main road which made them to think their settlement was no longer was a village.

With regard to the alterations, the interviewee #28, who added a small shed in front of the entrance, explained:

“There is no barrier at the door for protection. I mean, in winter when you open the door, the cold weather outside passes quickly into the inside, then no hot air left in the inside the house. This shed was a necessity in this respect”.

The interviewee #22 backed their reason for building a shed in front of their house by pointing the cold weather just as that above. Besides, since the barn in ground floor was highly criticised by the dwellers, most preferred either not to use it or transformed it into another residential unit. For example, the interviewee #33 explained their rationales as follows:

“We covered around the entrance of the barn, because it was too cold inside for the animals during winter. Of course, it is not good to have your animals at the ground floor while you are at the upper floor. It strongly smells and causes noise. I mean, it is not good, but we do not have other chance, too. The villagers, who were able to afford it, have already removed their animals out into a new barn they built. Afterwards, they even changed their ground floor into a residence as well, for example. We also did. We changed the half of the ground floor into a living room, and still use the other half as barn since we have few animals”.

As an example of what the interviewee #33 said, the interviewee #32 had built a separate barn near their house since their 3-4 cattle had got sick and died due to the lack of ventilation of the barn in the ground floor. The interviewee also stated that they would transform it into a residence whenever they finished building their new barn. The interviewee #27 clearly pointed the damp problem of the barn and how it affected some of the walls of the residence in the upper floor. Not differently, the interviewee #24, who also altered the ground floor and built a new barn, explained their reasons as follows:

“The height of the barn at the ground floor is low; hence there is no much of fresh air. The animals could not breathe. Thus, I built a new barn which is also a reinforced concrete building. In addition, it is larger and has also a large front yard. I transformed the half of the ground floor into a guest house, and the other half into a heating room since I surrounded the interior house with radiators system”.

With regard to the size of the house, the interviewee #34 stated that even though they found the single story house not large enough, they did not think to alter the house by building an extension room or so. They rather tend to keep the house as it was except the small shed they added to the entrance. They stated that they needed to add this because of the cold weather, wind and rain passing into the inside of the house. Having a rather concretely built shed throughout the exterior stairs, the interviewee #32 explained that they used the extra space as part of kitchen and the space under the stairs as a baking room to make breads. The interviewee #26, who also partially covered the stairs, explained that they used the space under the stairs to stock coal sacks and the covered entrance sufficiently blocked the wind.

Back to the size of the house and rooms, the interviewee #22 expressed that they found the house small in general, but since they were a small households, it was quite good for them. The interviewee #23 strongly criticised the plan of the two-story houses as he said that the size of the kitchen, the bathroom and the living room were nearly same which ‘nonsense’ in his own words was. The interviewee also had a livestock in the former location of the village which he had to go to 3-4 times in a day. In contrast to most of the interviewees in Erzurum, the interviewee #26 stated that they had no particular issue to mention as problem with regard to the house. Similar to the interviewee in Van, the interviewee #33 highly complained the direction of the houses by referring to the lack of sunlight that the inside of the house was often dark. She also added that the location of the house was not good since none of the rooms had scenery of the road. Differently, the interviewee #32 issued some problems regarding the infrastructure of the village as they said that during the winter the electricity had often gone off and they experienced the time that the water did not run for a week which also had an odour during the summer. In relation to the relocation and the village community, the interviewee #30 criticised the layout of the new settlement and the division of the village as they raised a different issue regarding the neighbouring:

“It would have been better if the houses were closer to each other. This way, the settlement is so dispersed, but it is not the mistake of the authorities. It is on whoever bought these lots like this. For example, they built all of the single story houses at the bottom of the lot. Besides, there are nearly 15 families living in the former settlement since they were not delivered the post-earthquake houses as their houses were classified undamaged. So they stayed there. However, it is also not good to divide the neighbourhood. They hire a shepherd for their animals over there, and we hire another shepherd for our animals here. I mean, it cost more than it was previously”.

Ultimately, the interviewee #35 also extended the front verandah of their house and built it as a room-like interior space. They justified that by stating that they had not enough rooms for their relatives coming from Istanbul to visit them, who also stay overnight. They also added that they renewed all inside the house in the past 20 years. Additionally, with the occasion of the agricultural-village project of TOKI under construction just nearby their village at the time of the interview, the interviewee’s opinion asked and they said they were interested in buying a house from the project for only investment purpose.

6.5 Discussion on the findings

As a conclusion to the chapter, the findings are briefly discussed in two-folds: within the study and within the literature reviewed. To begin with the first fold, despite their complaints on several issues regarding the reconstruction process and the quality of the houses, the result of the high overall satisfaction of the dwellers can be understood in the light of the statements of

the interviewees #18, #20, #21, #28 and #34. To say, they basically referred to the robustness of the houses and valued them as insurance of their lives; and also, compared its structural system with their former houses, which were earthen–adobe brick- buildings, and summed not necessary to maintain the way they necessarily did for their former houses. Finally, they also gave credits to the state's effort by highlighting that they were not left homeless after all. These inputs in their perspectives apparently lead to a more positive result in this regard.

The analyses discovered the relation of the size of the house and number of the rooms with the number of households and children. To say, the increase of the number of households and children causes the decrease in the satisfaction with the size of the house and the number of the rooms. Having said, this negative correlation does not apply to the overall satisfaction with the house. In this regard, the interviewees #18 and #29 clearly put in words why this relation does not exist. For example, one stated that the size of the house was not an issue that cannot be handled if the house was such robust in total, and the other underlined the functionality of the number of the rooms since they were able to allocate rooms for them, their children and their mother separately, even though the rooms were small.

To extend the abovementioned, there is a positive relation between the satisfaction with any given physical feature of the house and the overall satisfaction of the dwellers. However, the interviews uncovered that the quality of the structural and interior finishing material had the clearest effect on the overall evaluation. This relation had an underpinning of the involvement of contractors in the reconstruction process, which the majority criticised indeed. The interviews also yielded that the quality of the structural and interior finishing material had a significant role in the evaluation of the worthiness of the houses. That is, if they were poor, then the participants were more likely to critique the reconstruction process, which in turn they evaluated the house loans overestimated. As the questionnaire attempted to understand this integrated relationship through different variables, the interviews put them all together. For example, the interviewees #3, #6, #13, #22, #25 and #27 highly focused on these issues.

Furthermore, although the questionnaire did not propose the following division, the interviews yielded that there was a differentiation between the participants who had experience of construction and who had not. This differentiation became significant when they evaluated the reconstruction process. To say, the experienced participants were highly critical about the quality and the workmanship of the house; whereas the inexperienced participants were rather

appreciated. This controversy can be read between the interviewees #14, #15, #16 and #2, #11 and #18 as this finding was particular to the case study of Van.

The questionnaires included the effect of relocation as an indicator; but, the results statistically yielded were not easy to read for interpretation. To say, relocation had a rather positive effect in Erzincan, rather negative effect in Erzurum and a quite complicated effect in Van. In this regard, the interviews also guided a better understanding as they revealed how the participants' perspectives differed from each other's. For example, the interviewee #17 was glad for the relocation, which was due to the flood-proneness of the former settlement. The interviewee #29 was also glad as they were relocated nearby the main road, which increased their accessibility. In contrast, the interviewee #3 and #31 were quite discontent about the relocation as the interviewee #31 explained that it was inappropriate for the livestock since there was a highway just nearby and the surrounding area was lack of pastureland. Hence, such particular reasons caused people evaluated the effect of relocation differently. Having a livestock and the size of the livestock also affected the use of barn, which similarly resulted in a dichotomy that the participants with no livestock use their barns for different purposes, while the participants with large livestock had to build a separate one as the built one was insufficient.

To continue with the latter fold, a study from 1999 cites that the rural people used to keep their livestock in the ground floor as they used to prefer to live in the upper floor based on their traditional lifestyle. However, with regard to the two-story house plans implemented in Erzurum, the findings in this study are in contrast with that since the interview data discovered how the people actually avoid keeping their livestock in barn in the ground floor of their houses. Indeed, a few emphasised that they would have preferred their house as single story with a barn just nearby. Having said, the given study also cites that the houses implemented were left with plain concrete surface, which implied the fact that there were no improvements to address this issue in implementing the projects. Another study on the 1983 post-earthquake houses also noted that the people were keeping their livestock in the ground floor to benefit their heat as they were living on the upper floor. However, in this study, the interviewees strongly complained the malodour, noise and damp it caused. This can be understood as the change of the rural people's perspectives to their residences as they might have begun to value it and reflect this to the physical organisation.

The study of Dikmen (2010) on the 1995 post-earthquake houses found that the beneficiaries, who were delivered barns, did not use barns to keep their livestock but for other purposes such

as storing coal and hay, or as a baking room. Besides, her study referred to one beneficiary who had not been delivered barn despite owning a livestock. These are also similar findings with this study since it was found that most of the barns were in use to serve different needs, and few participants were reported as they were not delivered house even though it was damaged. This issue indicates that the process of the beneficiary identification and the property entitlement should be improved. Dikmen also revealed how the beneficiaries were struggling to repay the loan and how some were ignorant to do the payments. This also overlaps with the findings of this study as the participants in Erzurum had decided not to do the payment as a whole village community, and the participants in Van were implying their low-income and in Erzincan only the half of 80 had repaid the loan. Another study of Dikmen (2005) on the 2000 post-earthquake houses noted few particular cases which the contractors who had agreed to build the houses on behalf of the beneficiaries had escaped without completing the work. This also overlaps what some of the interviewees expressed in the case study of Van as they pointed how some of the contractors avoid contacting them and some left the construction incomplete. The study of Dagistanli (2007) on the 2003 post-earthquake houses put emphasis on the high satisfaction of the beneficiaries with their houses although they had experienced heating problem, which was linked to the use of improper wall material considering the geographical conditions. In this study, particularly the dwellers in Erzurum raised this issue, and despite the fact, their overall satisfaction level still resulted high as well. About the implementations in Van, it can be said that both the questionnaires and interviews revealed that the participants were satisfied with the heating inside their house as they often referred it easy.

The study of Tercan (2008) on the 2004 post-earthquake houses explained the relocation reason of a village he studied as the remoteness and lacking infrastructure, and noted how some of the villagers had kept living and animal husbandry in the former village. This also partially in line with the findings of this study given that few interviewees in Erzurum explained how they established a daily life between the former and relocated village due to their livestock. Besides, Tercan also implied that the housing implementations could have a preventive role in migration. This is another similarity with this study as the secondary data displayed the migration flow into Van after the completion of the houses had increased and few interviewees also expressed that they returned to Van after the delivery of their houses.

In relating the findings to further literature, in India, Barenstein (2006) found that the beneficiaries who built their houses on their own were highly satisfied with their houses,

whereas the beneficiaries whose houses were built by contractors were less satisfied with the size and the quality of their houses. Since the houses examined in this study were all built by the contractors and the interviewees raised issues regarding their work often by evaluating as poor, this can be taken into account as a reference point to argue the involvement of the contractors in post-disaster reconstruction for the rural.

In China, the literature referred to a village which was abandoned only after a short time of occupancy given the inappropriateness of the house and settlement layouts that lacks of considering the beneficiaries' livestock. Another study in China referred to the capacity building projects and highlighted that a part of the beneficiaries who had stated they would never be able to recover enough to repay the loan they had been allocated. The findings of this study also exemplify the above given the statements of the interviewees stressing their low and irregular income.

In Italy, the sources found discusses the cost of the transitional shelters implemented, which were expected to turn out permanent residences improperly built for long-term uses. Relating this to the study, it can be understood in the context of the worthiness of the permanent houses built which were deemed overestimated by the beneficiaries as they emphasized that a village house would not worth that much, according to their statements. In Japan, from a rather general perspective, the sources pointed how the rural communities often resist to relocation as they are bound to their location by natural sources as well emotional. This was the case observed in this study as the statistical data indicated that the dwellers relocated had a longing for their former house and settlement to some extent. Besides, for the case of Japan and China, the sources also highlighted that the villages were not reconstructed with a standard plan. Rather, there were villages redeveloped with particularly designed projects, either by the architects purposefully hired or by the organizations and institutions specialised on rural housing. In this study, only the two villages reconstructed as a pilot project of TOKI can be considered as such an example, whereas the remaining only exemplify the regular implementations, which can be entitled shelf-ready projects.

Chapter 7

Conclusion

Following the comprehensive focus on the case studies in Chapter 5 and the analyses and findings in Chapter 6, this chapter frames the study outcomes in the light of the theoretical and practical viewpoints drawn in the introductory chapters. The chapter begins with the evaluation of the research conduct. A discussion on how the practice of post-disaster reconstruction for the rural falls under a common theoretical understanding in the worldwide extent and why it needs a definite regional perspective follows. A suggestion is drawn to improve the post-disaster permanent housing strategy of the state and further issues raised during the research are summarised and valued as recommendations to take forward the research extent.

7.1 The evaluation of the research conduct

The early stages of the study involved constructing the conceptual framework of the research as well as the preliminary research question, which was based on the literature review and the initial field experience of the researcher as a damage assessment surveyor after the 2011 earthquakes in the province of Van. Without a doubt, having field experience at such an early stage made the researcher validate the research problem and understand the participatory-approach research challenges likely to be encountered in the further stages of the study.

In this regard, it should be emphasised that if the literature review remained the only source of the background to the research problem, both the research question and the framework would have been misdirected and, more importantly, unrealistic to the contemporary picture of the target region. In line with the approach strongly emphasised in the literature of disaster studies, the researcher took advantage of the initial field experience followed by an exploratory pilot fieldwork when planning the final fieldwork to collect the primary data of the study. Adopting a multiple-case study method guided sufficiently to address the research aim and objectives that sought to understand the impact of the post-earthquake implementations in the past 20 years. In terms of the investigation of the case studies, the mixed-methods approach combining qualitative and quantitative data was fruitful as expected.

Quota sampling was to limit the number of the questionnaires at 80 for each province, 240 in total. This quota was manageable and achievable considering the budget and performance of the researcher, the timetable prepared and the contacts made for the fieldwork. Eventually, each province was represented equally in quantity as desired. However, given the fact that interviewing is a process that needs longer time than conducting a structured questionnaire, the number of interviewees was not as many as desired. Besides, the attitude (shyness and conservativeness) of the rural dwellers was quite different in each province, which resulted with 21 interviewees from Van, 13 from Erzurum and only 1 from Erzincan.

With 240 questionnaires, 35 interview recordings and a large volume of photographs taken from the villages in hand, the researcher started categorising and conceptualising the data after completing the fieldwork. This started with mapping and imaging the built environment of the area studied. The preparation of the codebook to analyse the questionnaire data and deciding the themes to abstract quotations from the interviews were the following steps. When the researcher clearly decided how to link the data in hand, descriptive and inferential analyses of the questionnaire data in SPSS were started. Despite the fact that this process needed a significant amount of time, the results were highly enlightening in terms of achieving the goals of the research. Analyses continued with the interviews and their transcriptions. Since the interviews were designed as semi-structured and, thus, questioned particular issues, they were not too long to cause time consume. Rather, conducting interviews for several chosen themes was not only easy to proceed in the field, but also easy to extract the relevant quotations from the transcriptions. Besides, the chosen themes for the interviews provided invaluable insights to the research that could not have been covered so strongly and personally if presenting statistical analyses was the only research method selected in the study. In this regard, it should be emphasised that conducting mixed-methods research for disaster studies is considerably fruitful in terms of enabling the researcher to generalise the results from a sample as well as to take advantage of participatory-approach in research by revealing the stories of the people affected. The final task was to clarify the findings of the research, discuss the outcomes and compare with that of other studies. In doing so, it is aimed to address the knowledge gaps in theory and practice of post-disaster reconstruction and recovery. In addition, further suggestions were made as the possible future path by reminding what was excluded in the current research and how the knowledge established can be enriched and practised in other areas and populations. Accordingly, the following section brings a final discussion on the outcomes of the research.

7.2 Discussion on the research findings

As the research was immersed both in the transformation of the rural built environment and the adaptation of the rural communities in the Eastern Anatolia Region of Turkey, the empirical findings of the study are accordingly discussed in two main categories.

7.2.1 Transforming rural built environment after the earthquakes

This title brings together the prominent findings regarding the practice of post-earthquake reconstruction in the villages. It discusses the encompassing five themes primarily in relation with the demographic, physical and overall decision indicators as well as some aspects of economic indicators.

7.2.1.1 Reconstruction approach and hiring contractors

As highlighted in Chapter 3, the rural built environment in the region studied is highly susceptible to seismic motions as the buildings are generally built by their owners with no previous experience and technical knowledge, and, hence, regardless of the regulations and safety principles of construction. Therefore, the loss of human lives and livestock, the main livelihood for the most, is the result when an earthquake strikes. Understandably, the authorities in Turkey are primarily concerned with the reconstruction of the destroyed built environment in this regard. However, the implementations built after the earthquakes are largely the product of a top-down approach that neglects the active participation of the rural dwellers as beneficiaries, although the title of the approach adopted is promoted as having the beneficiaries in the core of the process. To say, even though the EYY (In Turkish: *Evini Yapana Yardım*) system adopted by the state is the synonym of the financial-help for owner-builders in theory, the findings of the study revealed that in the practice of the system the beneficiaries, i.e. the owners, are actually drawn out of the process and only contacted to complete the necessary paperwork in terms of certifying their ownership and allowing the required authorisation to the hired contractors to build the project on their behalf. Therefore, the approach adopted by the state simply turns into the agency-driven reconstruction via hiring contractors, since the two national agencies (TOKI and AFAD) lead the decision-making and impose the involvement of contractors to build the housing projects in-situ or in a relocation site on behalf of the beneficiaries in the rural settlements affected.

Taking advantage of conducting a mixed-methods research, the interview data guided a better discovery of the issues regarding the reconstruction in the villages. Firstly, the approach of

hiring contractors to build the houses was criticised by the dwellers, particularly in Van, as they strongly emphasised that they could have built the houses of better quality and with the layout according to their needs. Nonetheless, this viewpoint was rather common among the dwellers with the experience of working in construction sites previously. Hence, they expressed their critiques in detail by exemplifying what they had seen lacking compared to the actual application plan of the houses. On the other hand, the dwellers who had no experience or knowledge of construction were happy that the contractors had built the houses on their behalf since the dwellers deemed themselves not capable to build a house like those were delivered.

Besides, the process of finding and hiring a contractor was also a challenging task in most villages. During the fieldwork it was found that while some villages were constructed by only one contractor without any problem being raised, in some villages more than one contractor involved in the construction of the houses. Specifically relating to the implementations in Van, this was not a simple case that happened because of the large number of houses needed to be built; rather it happened as an inevitable inference since the contractors previously involved had left the construction of the houses in the half-way stage. In a few villages that experienced this issue, the dwellers with construction experience took the lead and involved in the construction of the houses in their village not only to control the process at first hand, but also to ensure the structural quality of the houses. Nevertheless, the differences between the structural and workmanship quality of the houses built by different contractors was one of the most commonly highlighted issues by the dwellers as several of them even reached the point of accusing the contractors of making profit from their loans and accusing the decision-makers for not controlling the process on site responsibly enough. In addition to the physical problems highlighted, including the lack of structural quality of the houses and the use of poor quality finishing materials for the interior of the house, the dwellers also complained they were not easily able to contact the decision-makers to voice their requests and problems as communication with the contractors was already severely lacking.

7.2.1.2 Use of non-local structural materials and systems

Comparing the earlier traditional character of the built environment in the region, which was explored in Chapter 3, it can be clearly seen that the post-earthquake housing projects are the implementations that suddenly replace the traditional character of the settlements to transform the built environment into seismic-resistant and modern-looking settlements. However, as to the statistical data of the study, this approach by the state is highly welcomed by the rural

dwellers since they agreed that they no longer preferred living in traditionally built houses. Besides, this result suggests that the post-earthquake implementations of the state were an opportunity for the rural people to have the houses they imagined, which are built regarding the basic principles of frame structures. In other words, considering the familiarity of the rural dwellers in the region with concrete as a kind of structural material, but the numerous examples of their malpractice in building reinforced concrete frames, the implementations were an opportunity for the state as well to reduce the vulnerability of the built environment primarily caused by structural faults as the product of malpractice of the owner-builders.

In this regard, from a wider perspective, it can be said that the implementations also addressed the need of correcting the misleading idea that the rural dwellers had fallen into, which is the belief that to rely solely on the potential strength of the material would be enough to make the building resistant to earthquakes even if they neglect the construction principles.

To explain the slightly lower proportion regarding the preference of the structural system, the statistical data of the study discovered that the difference occurred particularly because of the low rankings of 19 participants in Van, which comprises 8% of the participants in the study. The reason of the dwellers' low rankings was mainly the use of steel as the construction material and building the houses as a light-steel frame, which the dwellers were completely unfamiliar with. This result also implies that the dwellers had not been taught about the properties of this kind of structural system and how it would be safer than reinforced concrete houses in case of an earthquake, which are also further implications that they did not take part in the decision-making process. Also, the dwellers living in the light-steel frame houses were not only less happy with the structural system, but also more prone to leave their houses in future, and they found it less worthy compared to the larger amount of loan they had been given than that given for the reinforced concrete frame houses. Therefore, lacking information and implementing unfamiliar technology in such rural settlements resulted in lower satisfaction of the dwellers than the dwellers that were delivered reinforced concrete frame houses. In short, the study showed that the rural dwellers were largely familiar with concrete and the use of concrete well pleased the dwellers, even though it was a non-local material. In contrast, the use of steel mostly did not please the dwellers as they were not familiar with it.

7.2.1.3 Relocation and layouts of settlements

Relocation is a widely made decision in almost all kinds of post-disaster implementations given that it saves time and cost by bringing the opportunity of avoiding or delaying debris

clearance and preparation to initiate the construction. In this study, similarly, the examples of the post-earthquake housing implementations from three case studies approved that relocation was apparently the highly preferred strategy by the authorities in Turkey as well. That is, 165 of 240 dwellings examined were relocated in terms of being built at a far distance to their authentic locations. Basically, it was found that there were two types of relocation applied – the relocation of an entire settlement to a new site and the relocation of several dwellings within the same settlement.

The primary reasons behind most of the relocations were to provide sufficient size of plot for the construction and for the dwellings, as well as to begin their reconstruction quickly, as to the dwellers' needs. For example, in Erzincan, it was found that the relocated dwellings in the village of Saztepe were built in plots with a size of 1000 m², and the dwellings in the village of Altınbaşak were built in plots with a size of 500 m² due to the large number of relocations. In contrast, a few participants in the village of Alaca in Erzurum complained of the density of their settlement, where the post-earthquake houses were mostly built in their authentic location with only few exceptions of relocations. Similarly, by looking at the settlement layouts of the relocated villages of Topaktaş and Özkaynak in Van, it can be seen that providing large size of plots for the dwellings was the intention.

However, such simplified approach in relocation does not always provide the best for the dwellers. For example, the dwellers in the village of Paşayurdu in Erzurum emphasised that they needed to take their cattle to the pastureland around the former location of their village since the relocation site was just by the road and, thus, dangerous for the animals. Moreover, it was also found that the process of decision-making for relocation had caused the division of several villages (e.g. Çiğdemli and Paşayurdu in Erzurum), which can be considered as unsuccessful intervention not only because of dividing the unity of the village community, but also causing difficulties in the dwellers' daily life.

Apart from the intentional and procedural rationales leading relocation, the relocation of some villages examined in this study was a deliberate decision according to the dwellers since their villages were situated on liquefiable lands and at low altitude that was prone to be flooded when it rained heavily. For example, the village of Tazegül in Erzurum and the village of Özkaynak in Van were entirely relocated due to the rationales mentioned respectively.

Regarding the layouts of the settlements in the relocation sites, it can be simply said that having the houses situated aligned to each other is quite in contrast with the naturally formed

settlement patterns of the villages in the region. For example, the settlement layouts of the villages of Topaktaş in Van and Paşayurdu in Erzurum were found quite dispersed in general by the dwellers as they said that the land could have been better planned and used. Furthermore, the direction of the entrances of the houses, which were situated opposed to each other, was criticised by few dwellers as they thought it decreased their privacy.

Shortly, the study revealed that the lack in understandings and mistaken decisions made during the process of identification of the beneficiaries and the planning of the layouts of relocation sites were the common significances to conform the unity and identity of village communities. Selection of the relocation site, however, had diverse effects; the dwellers with livestock more cared about the existence of surrounding green areas, while the dwellers involved in different kinds of livelihoods were satisfied with being relocated to the areas near the main roads and being close to a city centre.

7.2.1.4 Standardisation of house plans and use of barns

It is understood that from the standpoint of the authorities it is not possible to practise detailed customised projects since the nature of post-disaster implementation immediately urges the construction of many houses in the first place (Shaw and Ahmed, 2010). Despite this, as emphasised in the context of this study, the implementations should not repeat each other; rather the authorities should take the opportunity of each disaster to improve the deficient sides of interventions and to develop projects better meeting the needs of the beneficiaries. This study also made an attempt to explore how the physical features of the post-earthquake houses had been improved over the years.

The study revealed that the approach of the authorities in Turkey to the standardisation of post-earthquake houses has improved as seen from the examples of the implementations completed in the past 20 years. That is, as of 2012 the variety of the house plans offered to the village dwellers in Van was multiplied to five, while there was only one type of house plan for all of the implementations in the villages of Erzincan in 1992, and there were only two types of house plan for the implementations in Erzurum merely because of the dwellers' entitlement conditions. Whilst, in addition to having five options to decide the house plan, the beneficiaries in Van were also able to negotiate the size of the houses with the contractors by paying a small amount extra to have a larger house with one more bedroom, as a standard house had only two bedrooms. As a result of having such flexibility in deciding the plan and size of the houses, the dwellers in Van statistically displayed higher satisfaction than that of dwellers in Erzurum and

Erzincan. Besides, considering the larger size of households in Van, this approach was appropriate to provide accommodation with comfort to some degree for such families.

It was found that the physical features of the post-earthquake houses examined in this study were part of the dwellers' expectations as they were also effective in the overall satisfaction of the dwellers. Hence, by taking into account the lower satisfaction scores of the dwellers in Erzincan and the higher satisfaction scores of the dwellers in Van, it can be concluded that the post-earthquake housing projects developed by the state improved not to a great extent, but to a reasonable extent.

Having said that, exploring how effectively the barn units were in use and to what extent they were important for the livelihoods of the dwellers, it was found that the barns had been mostly used for other purposes than just keeping the dwellers' livestock. This observation was understood as the inevitable result of the socio-economic adaptation of the dwellers, which is the switch mainly from being dependent on agriculture to being independent. Hence, the dwellers who had no livestock but were delivered a barn as well, had taken advantage of their barns to provide further residential space or use it as storage to keep general stuff. There were even a few dwellers that had rented or sold the barns they had to their neighbours, since they did not need them. In this regard, barns can be seen as extra units the beneficiaries receive that they can make use of in a way they actually need. Notwithstanding, the satisfaction of the dwellers with livestock was rather dichotomous as that was mainly dependent upon the size of the livestock they had. That is, for a few numbers of cattle, the size of the barns was sufficient, but for larger numbers of cattle, the size of the barns was insufficient as the dwellers needed to extend the unit or build a new larger barn.

Therefore, what can be drawn from the findings is that the authorities conducting the process of identification of to whom to deliver a barn should have more of an individual approach to understand whether or not the beneficiary actually needs the barn. This kind of process would also prevent wasting money on not-used buildings and pushing rural people into unnecessary amount of loans required to be paid.

As another aspect of the physical features, the alterations the dwellers had done to their houses were examined as a part of user needs. It was found that adding a shed to the entrance of the house was the most common in all three case studies. This was simply an attempt at preventing the cold weather (snow and rain) and dust to pass into the house as much as an attempt at providing more privacy according to the socio-cultural aspect of the rural dwellers. Besides, in

Erzurum and Erzincan, the dwellers had partially modified (e.g. drainage pipes and roof) and renewed (e.g. floor covering) their houses just with the purpose of maintaining them.

7.2.1.5 House loans and paying model

In Turkey, the house loans provided by the state for the reconstruction have a standard payment model that is interest free and with equal instalments throughout 20 years with an authorised suspension (*moratorium* in law terms) of two years at the beginning. However, the study revealed that the model is not applicable in practice considering the instability of the beneficiaries' economic circumstances, which was largely stressed by the dwellers in the interviews.

Going through the case studies, in Erzincan, of which the beneficiaries were anticipated to have completed paying the loan back as the 20-year period ended by the time of the fieldwork, indeed only less than half of the participants have completely paid their loans back and not through the monthly equal instalment model, but through making large amounts of payments on several occasions. Only very few had followed the model defined by the state, and one stated that they made the payments annually, not monthly. That means, most of the second half of the participants in Erzincan had not made any payments as they implied that they did not consider making such payments regarding the loan. This was also the case observed in Erzurum, where none of the beneficiaries with no exception had made a payment at all despite they were supposed to complete paying back nearly half of the loan since a decade had passed by at the time of the fieldwork. One of the participants explained the situation as an inevitable result of the guaranteeing system of the loan that made each beneficiary responsible for other beneficiaries in a village. Aligned with this explanation, one participant also expressed how they worried about not making the payments for not to break up the village community although they wished to pay the loan. Having referenced these two case studies, it can be strongly foreseen that the beneficiaries in Van very likely may not be paying the loans back because the aspects highlighted by 21 interviewees depict the same picture in terms of economic boundaries and insufficiency as well as loyalty to the village community.

However, the house loan model is not a challenging issue particular to the target region or the population of this study. Dikmen (2010) examined the same issue across the beneficiaries of the post-earthquake houses built after the 1995 earthquake in Dinar (a district in the province of Afyon in western Turkey) and found that half of the beneficiaries were either not fully aware of the amount they were required to pay back or were ignorant to make payments as they had

pointed out their poor economic conditions, while the second half had only been able to pay less than half of the loan although 13 years had passed since delivery of the houses. Accordingly, Dikmen (2010, p: 204) concluded that the beneficiaries deemed the post-earthquake reconstruction scheme of the state as *'the opportunity to get a free or very cheap house'*.

The vagueness at the amount of the loans required to be paid back was also observed in three case studies of this research. For example, the beneficiaries in Erzincan, who completely paid the loan back, mentioned amounts varied from 55,000 TL to 190,000TL, which indicates a large difference. Only few participants clearly stated that they had paid 75,000TL for the house and 50,000TL for the barn. In Erzurum, the participants mentioned amounts varied from 52,000TL to 61,000TL according to the type of house they had. The beneficiaries significantly emphasised that the loans were overestimated comparing the value of the houses built in terms of their structural quality and rural location, which was the main reason indeed. In other words, being situated in a village would already make a house less worthy from the viewpoint of the dwellers as they also found them lacking in quality. Hence, they were certainly against making payments, apart from being economically restrained. The amount that the beneficiaries in Van were required to pay varies from 40,000TL to 75,000TL, depending on the type of structural system of the house they had. The dwellers' viewpoints in Van were rather dichotomous as, on one hand, some stated they would prefer annual payments instead of monthly payments and also found the amount payable only in a longer period of time than 20 years, e.g. in 30 years. On the other hand, the viewpoints of some participants overlapped with those of Erzurum, as they stated the value of the houses was overestimated basically because of being a village house. Few also similarly implied that they would not be able to pay the amount at all, pointing out their low and irregular income. An interviewee alternatively suggested that half of the loans should have been granted given the fact that the villagers had no regular income.

Nevertheless, based on the statistical data and interviews obtained from three case studies, it can be concluded that providing financial assistance for post-earthquake housing reconstruction usually turned out as capital investment of the state itself aiming to reduce the physical vulnerability of the area affected against future natural hazards. However, it is apparently not a desired consequence on behalf of the state considering the enormous amounts invested in this way. For example, the amount allocated to assist the reconstruction and recovery in Van was estimated at approximately 5,5billionTL (AFAD, 2012), which is expected to be recouped in 20 years, but very unlikely to happen. This consequence should be

associated with the amounts of the loans being found overestimated by the beneficiaries and the instalment model being not compatible with the susceptible livelihoods of the beneficiaries.

7.2.2 Vulnerable rural communities and their socio-economic adaptation

This title discusses the prominent socio-economic findings of the study under the themes of livelihood, and place attachment and migration. In addition, it also discusses the dwellers' disaster awareness. Accordingly, it relates primarily the social and economic indicators as well as some aspects of demographic and overall decision indicators.

7.2.2.1 Livelihood

Since livelihood is acknowledged as one of the elements contributing to the increase of vulnerability in pre-disaster conditions and also limiting the coping capacity in post-disaster conditions, the low-income and poor communities are deemed the most vulnerable in the context of their livelihoods. The members, i.e. households, of such communities are mostly dependent upon the financial and physical assistance provided by the state in case of a disaster as they are often omitted from insurance schemes to recover such as health and property.

The findings of this study are not in contrast with the facts stated. That is, in accordance with the regional characteristics highlighted in Chapter 5 and in the related appendices of the case studies, more than a third of 240 participants of this research were dependent upon agriculture, mainly animal breeding, as a single source of income. The share of Van was the highest as more than half of 80 participants own a small or large number of livestock. The share of Erzurum followed as also nearly half were dependent on animal husbandry, which are the results overlapped with the strong rural characteristics in the provincial extent.

Differently, in Erzincan the number of the participants dependent on agriculture was the smallest, whereas the number of the participants retired and receiving regular monthly pension payments or that collect rents from their rental properties was the highest among the three case studies. This situation was just the opposite of that in Van. This can be understood as the result of the socio-economic adaptation of the rural population in Erzincan which took place in the past 20 years. The study explored that the rural people affected by the 1992 earthquake had developed various strategies to recover and to sustain a less vulnerable livelihood. To this aim, the majority had left agricultural activities and had started to work in jobs, mostly in urban areas, which pay on a regular basis along with the advantage of being covered by an insurance scheme of the state. In turn, since a 20-year period of time has passed, the same majority is

‘retired’ today and secured by monthly pension payments, which apparently decreased the vulnerability of their financial status as it became stabilised. Besides, there even were some households that take advantage of a secondary income as they had rental properties and retail shops, or they continue farming to a small extent.

Furthermore, some had chosen to migrate out of Erzincan by the time they had found a secured job and took the opportunity to establish their lives permanently away from their villages, which today they visit temporarily only to have their summer vacation. This means that they also became less vulnerable in the context of physical conditions as they have the second accommodation, which they can move into in case the other is damaged by an earthquake. Hence, it can be concluded that the adaptation of the rural population in Erzincan enhanced their coping capacity in case of a disaster, and made them far less dependent on the direct assistance of the state.

In contrast, the experience of the 2011 earthquakes showed that the rural population in Van was severely dependent upon the direct assistance of the state. Notwithstanding, by looking at the distribution of kinds of livelihood and the quotations of the interviewees from the villages of Van, it can be said that the process of socio-economic adaptation is in the early stage, but with the effects of the 2011 earthquakes, the process is very likely to be accelerated and will show results in the next couple of decades, just like the case observed in Erzincan. To further explain, given the differences highlighted between the perspectives of the young and elder population in Van, the attraction of living in the urban area and the advantage of urban labouring will increase the degree of flow of the young population from the rural to the urban. In turn, it will cause a shift in the rural economic characteristic of the province in terms of changing from being agriculture-dependent to being salary or pension dependent considering the potential return of the young population of today.

Between the early and late stages of the socio-economic adaptation of the target rural population in the target region, Erzurum clearly made an illustration between the two, Erzincan and Van, as to the findings of the study. That is, the numbers of participants in three groups of livelihood were found quite proportionally distributed that suggests the decrease in number of agriculture-dependent dwellers would result in the increase of number of dwellers joining in the urban labour market and retired. Particularly, the relatively higher numbers of the participants work as urban labour in Erzurum and Van implying that the city centres of these two provinces continue to suppress the rural areas, whereas the far smaller number in the urban

labour of Erzincan implies that the attraction of the city centre reached saturation point, both because the rural areas are left to aged population and the expansion of the urban area made it easy to establish a daily life between the urban and the rural, which broke the psychological wall in the rural dwellers' mind.

However, to make a special note, it should be reminded that the adjustment in livelihood appears an inevitable result of the disasters since the majority of the participants stated they had lost their livestock under the debris or had had to sell them to make money so they could afford their immediate needs. Taking this opportunity, when they started to recover, some preferred not to continue any of the agricultural activities, and some preferred to have only a small number of livestock just to supply their own needs while they found a secondary source of income such as working as security staff or school bus driver.

7.2.2.2 Place attachment and migration

Place attachment cannot be understood by simply quantifying the data. Rather, it requires a holistic perspective to interpret the strength and extent of the attachment of a society or community to their 'place', which mainly indicates the landscape and settlements where the people establish their daily routine by reflecting their socio-cultural and economic aspects. To say, people may feel attached to a place through historical, memorial and emotional bonds (Williams and Vaske, 2003). In this regard, grounding 'place attachment' is doubtlessly more critical for rural communities, which was accordingly another focus of this study. Briefly, it was discovered how strongly the rural dwellers feel themselves attached to their villages even if they started to become less dependent on land use and animal husbandry, and even if they had totally become independent from their village.

Going through the case studies, in Van, for example, few participants emphasised that they would not live elsewhere but their village since they had already experienced the life in urban areas and found it highly challenging compared to life in the rural. In Erzurum, similarly, there were some participants who had properties and close relatives (e.g. son and daughter) in the city centre but still keep living in their own villages as they preferred so. In Erzincan, a rather extreme example, there were a number of participants that had permanently migrated out of their villages and live in other provinces of Turkey or even abroad, but still keep their post-earthquake houses as a property since they come back just to pass their summer vacation.

This observation also indicates that even if a disaster strikes and destroys the people's built environment, it does not have a substantial effect on decreasing the people's place attachment feelings. Indeed, they look forward to the completion of their post-earthquake houses as they consider their houses a medium of their attachment and a mark of their existence. However, such strong emotional bond is not the case applying to all because some of the participants clearly stated they were limited either because of their agriculture-based livelihood or being unskilled to be employed in different sectors. Thus, they had more economic bonds than emotional bonds. In addition, there were some dwellers that clearly expressed that they were strongly satisfied with their post-earthquake houses and relocated settlements, which attached them more to their 'place' as they had found physical comfort to some extent. Accordingly, as a result of grounding the place attachment through such bonds, it can be understood why the great majority of participants agreed that they wished to live in their post-earthquake houses for the rest of their lives and disagreed that they were likely to consider leaving their houses in the future.

Despite this fact, it was also found that most of the rural dwellers were keen to have jobs providing regular income and insurance as most considered themselves either low-income or poor. In this regard, the findings of the study implied that the tendency of abandoning agriculture and settlement was relatively high among the dwellers that completed higher education (e.g. college and university). This can be interpreted as the more skills and knowledge the dwellers gain, the more they become employable in different sectors, which in turn encourages them to migrate from their village, at least as an individual.

Given the fact, by looking at the characteristics of the rural people in Erzincan, who are aged, retired and independent from agriculture, it would not be an overestimation to say that the rural population in Van is very likely to experience such adaptation within the next two decades as well since the current potential of the young generation moves towards it. Although such clear relation between education-economic capacity-migration observed in Van and Erzincan was not observed in Erzurum, which rather displayed more of a conservative rural population that restricts the individuals (primarily women) in village community, both the statistical and interview data of the province mark the process of the rural population's adaptation in the middle of Van and Erzincan, as expected in the context of the study. Consequently, the study revealed that there is a long-term socio-economic adaptation in the region that the rural dwellers attempt to better establish their income scheme by gaining employability skills through education and practice, which thus affects the place attachment of the people.

7.2.2.3 Disaster awareness and coping capacity

As discussed in Chapter 2, vulnerability is a multi-dimensional concept that, in the context of the study, building earthquake-resistant built environment cannot decrease the vulnerability. Indeed, building earthquake-resistant buildings and relocation of affected settlements may only practically decrease the probability of exposure to natural hazard, susceptibility of the built environment, and, hence, the potential risk of life loss and injuries. These aspects are apparently among the actions needed to be taken in terms of disaster mitigation; however, they do not enhance the ability of the community to cope with the impacts of disaster.

The study revealed that the perspective and approach of the authorities in Turkey to disaster mitigation is limited to this lack of understanding, since there was no an organisational training scheme to inform the local people about the natural hazards they experienced, the reasons why it turned into a disaster, the role of the built environment and the ways of building it better, and how to be prepared on a personal and community scale. Only few participants in Van were found that participated in such programme. Nonetheless, although the programme was conducted by an international organisation, *Caritas*, it did not have the official support of the authorities, except a local cultural society that helped to print the handbooks for the training. Besides, since the training was concentrated on owner-built approach in reconstruction, it did not continue for long given that the reconstruction approach imposed by the authorities required hiring contractors to build the houses. In Erzurum, only two participants were found that had participated in that kind of training, but only because of their own interest. In Erzincan, no participant was found that had such training experience. A research completed in the early aftermath of the 1992 earthquake mentioned only two people trained by the government among its 66 respondents (Meguro and Nakano, 1993). These findings critically imply that the authorities in Turkey overlooked the disaster mitigation and simplified it to the reconstruction of the damaged built environment after earthquakes, which was already emphasised in Chapter 1. Consequently, the disaster awareness of the rural communities does not go further from what they learnt by themselves from their experiences that in turn they develop several short-term and long-term adaptation strategies, which vary from temporary migration to changing source of income to sustain sufficient living conditions and livelihood.

Furthermore, because the reconstruction approach adopted by the state is more top-down which draws the beneficiaries out of the process and often ignores to inform them why the decisions made were thus made and how they prevent them from future hazards, there is a

contrasting finding in the study. That is, despite a great majority agreed that they feel safer in their post-earthquake houses as they also rely on its seismic-resistance, they also implied that the catastrophe they experienced was invoked by God, and anything built by humankind is vulnerable in the end when God has the will to destroy.

Such viewpoint is not particular to the area, population or the kind of hazard studied. A study by Stephens et al. (2012) also found that the majority of the survivors of Hurricane Katrina and the Chilean earthquake described the catastrophe they experienced as *the act of God*. In fact, the perspective of fatalism caused by religious beliefs is indicated as one of the input factors that increase the vulnerability as it can be used to misinterpret the meaning and conditions of risk (Cannon, 2008). Thus, religious beliefs can make people passive at taking action and responsibility to prepare against disasters (Ghafory-Ashtiany, 2009). However, this is not to say that religious beliefs only have negative effect in this context; rather, it is widely suggested as a psychological strategy to cope with the traumatic effects of disasters (Gillard and Patton, 1999; Hussain et al., 2011; Bentzen, 2013). Even though, specifically speaking for the study, education of the rural dwellers to raise their disaster awareness should be an essential part of the reconstruction programme of the state in terms of non-structural disaster mitigation. Based on the observations from the fieldwork, the authorities representing the state hold the key role to encourage or discourage members of the rural communities to take action.

7.3 Overall outcomes of the study

In the light of the findings of the study and concluding discussions regarding the fundamental themes of the study, it can now be evaluated to what extent the study accomplished addressing the research aim and the objectives given in Chapter 1.

7.3.1 Addressing the research aim

This study was shaped around the research question of ‘How have the post-earthquake reconstruction implementations affected the rural communities and changed their built environment in rural eastern Turkey?’. Accordingly, the research aimed to understand the relationships between the impacts of the earthquakes, rural communities affected and post-earthquake housing projects to reveal the extent of the change in the target region.

Firstly, the most important challenge in this question was to define a timeframe to address the focus on ‘change’ sufficiently, which was obviously not possible to achieve by assessing a recently completed project. However, the need of assessing further projects completed in the

past was also a challenge since it entails the questions of ‘how old the projects should be’ and ‘how much is it observable today to collect valid and reliable data’. With regard to the collection of valid and reliable data from past projects, the concern was the availability to collect the primary data from the beneficiaries themselves since the research had the scope of examining the adaptation of the rural dwellers and evaluating the projects from their perspectives, not from other stakeholders. In this regard, after reviewing a few options of the post-earthquake housing projects completed in different provinces of the region, it was found reasonable and promising for the study to include the projects completed two decades ago in Erzincan to observe long-term implications of the change, the projects completed almost a decade ago in Erzurum to observe the mid-term implications of change and the projects recently completed in Van to observe the initial stage of the change. By doing so, the change was effectively brought into the context of the study.

Secondly, the projects selected exemplified the change in the rural built environment and successfully provided a solid background to the research argument, which is the post-earthquake housing reconstruction by the state had a transformative approach. Whilst, this has been negatively criticised by the academics in Turkey as the approach was against the traditional character of the built environment in the region and neglects the needs of the affected community, the study revealed that the projects were not unwelcomed by the rural dwellers in the region. Indeed, in spite of the issues commonly raised by the dwellers regarding the reconstruction process and about the projects, the idea of having a newly built house meeting the requirements and under the sponsorship of the state was highly attractive for the rural dwellers. However, this outcome had its underpinnings primarily based on the socio-economic characteristics of the regional population, and for this reason, the research question had also the focus on the change of the rural communities in terms of linking the influences of their adaptation to the regional dynamics.

Therefore, thirdly, the examination of the first-hand data acquired from the dwellers living in the selected projects enlightened the progress of adaptation and resulted in coherent and relatable implications. Basically, the results indicated that being stricken by a highly severe earthquake and experiencing the impacts in all extent pushed the rural dwellers to find ways of adapting their livelihood and making themselves as least vulnerable as they possibly could. That is, it was found that the adaptation was embodied in the preference of continuing further education and being employable in different sectors, which caused shift in the livelihood pattern in turn. Besides, considering the themes of migration versus place attachment, the

current picture in Van depicted the post-earthquake projects in a highly effective role at preventing the permanent migration out of the area. Nevertheless, this effective role decreases in time as per the observation of the examples in Erzurum, which uncovered a number of unoccupied houses in the villages visited, and as per the examples in Erzincan, which uncovered that many houses were only occupied seasonally as their owners had established their lives out of the area. All in all, by focusing on the themes of change, transformation and adaptation together, the study addressed the research aim by outlining that the earthquakes trigger the changes and in the aftermath, the transformation of the built environment through the implementations of the state is the expectation of the rural communities affected and hence, the adaptation that was slowly progressing before the earthquakes, accelerates and starts to change the socio-economic patterns across the regional population.

7.3.2 Addressing the research objectives

With these outlines in mind, the research objectives can now be evaluated by explaining how the research results and findings addressed each objective.

Objective 1: *To explore the dimension of rurality and vulnerability in the Eastern Anatolia Region through socio-economic indicators.*

As the first objective of the study, this aims to establish an understanding of the rural community in the given region. To address this objective was essential for the quality of the study indeed considering the fact that it seeks the perspective of the rural dwellers. Hence, knowing their circumstances primarily in terms of socio-economic boundaries, not only within the scope of the region itself but also in the scope of the country was to clarify why the target population of the study is deemed vulnerable. Besides, it was also necessary to understand the link between the rurality and vulnerability since the region resembles an example of this relation. Accordingly, a part of the literature reviewed in Chapter 2 addressed this objective by illustrating numbers and figures in the worldwide extent, which also explained how come the rural suffers disparities and remain less attractive than the urban. In extension of this, a part of the additional literature in Chapter 3 focused on the regional disparities in Turkey by highlighting the high level of rurality of the given region along with the high risk of exposure to earthquakes. Putting these highlights together, the argument of the study was objectively justified, that is, the rural is vulnerable, and also the research gained a preliminary perspective on the region and the rural population.

Objective 2: *To understand the traditional aspects of rural housing and the role of the implementations in the change of the architecture in the rural eastern Turkey with relation to the socio-economic challenges of the rural community.*

This objective had two focuses. Firstly, it focused on the appearances of rural built environment under normal conditions, which referred to indirect influences of earthquakes. To this aim, a set of secondary data was combined with the observational imagery data gathered during the exploratory pilot fieldwork. By doing so, it was pointed out how the current tendency in construction practice was different from the practice of traditional architecture in the region and by that, it was highlighted that the reason behind the shift in the practice was the indirect influences of earthquakes (the will to build robust houses) and the effect of modernisation (the will to increase housing quality by imitating the look) imposed by the urban areas. Chapter 3 solely addressed this focus. The second focus was on the built environment formed after the earthquakes, which referred to the direct influences of earthquakes. As this focus was studied through case study method, the projects were extensively presented in Chapter 5 and the sample settlements were detailed in the appendix. With the imagery data in hand making comparable both conditions, the arguments of transformation and the transformative housing strategy of the state were adequately justified.

To understand the lacking parts of the post-earthquake permanent housing projects in providing physically adequate conditions for dwellers, a further focus was also made on the alterations done to the houses, which was examined also through the questionnaires and interviews. As this was to depict the continuity in transformation at the house scale, the continuity in transformation at the settlement scale was indicated by implying the administrative changes from the village level to the district level, which were noted along with other implications in the related appendix. Such change in local governing led some rural settlements to turn into a district-level settlement with larger populations and some had become a peripheral part of the central urban area of the province. Thus, the transformative strategy of the state for rural settlements was also justified by such examples.

Objective 3: *To explore the rural dwellers' perspective to the post-earthquake permanent housing implementations and their experience of adaptation to the changing physical and socio-economic environment in the aftermath of earthquakes.*

This objective was to understand how the earthquakes affected the dwellers and to establish the viewpoint of the dwellers because the study made a particular attempt to evaluate the post-

earthquake permanent housing projects from their perspectives. To this end, different methods were utilised to collect the data needed. Using questionnaire with closed-ended questions mostly structured within a 5-point Likert-scale was the quantitative method. Considering the amount of data and the statistical models operated, the questionnaires conducted were quite adequate to explore not only the characteristics of the target population, but also the relations of the dwellers' perspectives, experiences, and characteristics with how they evaluated their post-earthquake conditions. Therefore, the statistical data derived from the questionnaires were highly fruitful in terms of understanding the overall perspective of the dwellers and evaluating the post-earthquake permanent housing projects.

Having said that, since this type of result is derived through data reduction to enable the results to be generalisable, relying only on the quantitative results would not directly reflect the perspectives of the dwellers, and hence, it also would not be enough to address the objective. Notably, conducting semi-structured interviews as the qualitative approach to the source of data assisted to accomplish the objective in full by revealing a wide range of ideas and perspectives, which brought different and in-depth insights into the research context. For example, without conducting the interviews, it would not have been possible to uncover the problems regarding the involvement of contractors and the reasons behind the dichotomy in preferring different method of housing construction (i.e. owner-built and contractor-built) or the relation between making no payments so as not to break the village community. In this regard, the methods preferred for data collection were compatible with the objective as the variety and the content of the results were those the objective sought.

Objective 4: *To identify the aspects of the transformation of the built environment and the adaptation of rural dwellers as the key indicators leading to success or failure in implementations.*

This objective involves summative evaluation of the research results and findings as the study had the aim of evaluation of the change in simple terms. Summative evaluations focus on the outcomes of the project and assess to what extent the project or programme addressed its promises. In this regard, by collecting first-hand data from the beneficiaries to hear about the process of reconstruction and delivery of the projects, visiting them in their natural settings to observe how their built environment has been changed and how they adapted to the changes that the projects brought, the study thus far conducted an exhaustive summative evaluation indeed. In sum, the results of analyses and highlighted findings drawn from a dataset consisted

of questionnaires, interviews, observational notes and imagery data supported with secondary data thoroughly reflected the effects and outcomes of the post-earthquake permanent housing projects implemented in the rural areas of the Eastern Anatolia Region of Turkey.

Accordingly, as in Chapter 1, the themes of the study were drawn in a conceptual cycle highlighting the transformative housing policy of the state, adaptation of the dwellers after resettlement and the failure of recovery that may cause the vulnerability to continue. These themes now can be redrawn in a linear relation encompassing their impacts and results as shown in Figure 7.1, which also highlights the impacts deemed as mal-adaptation.

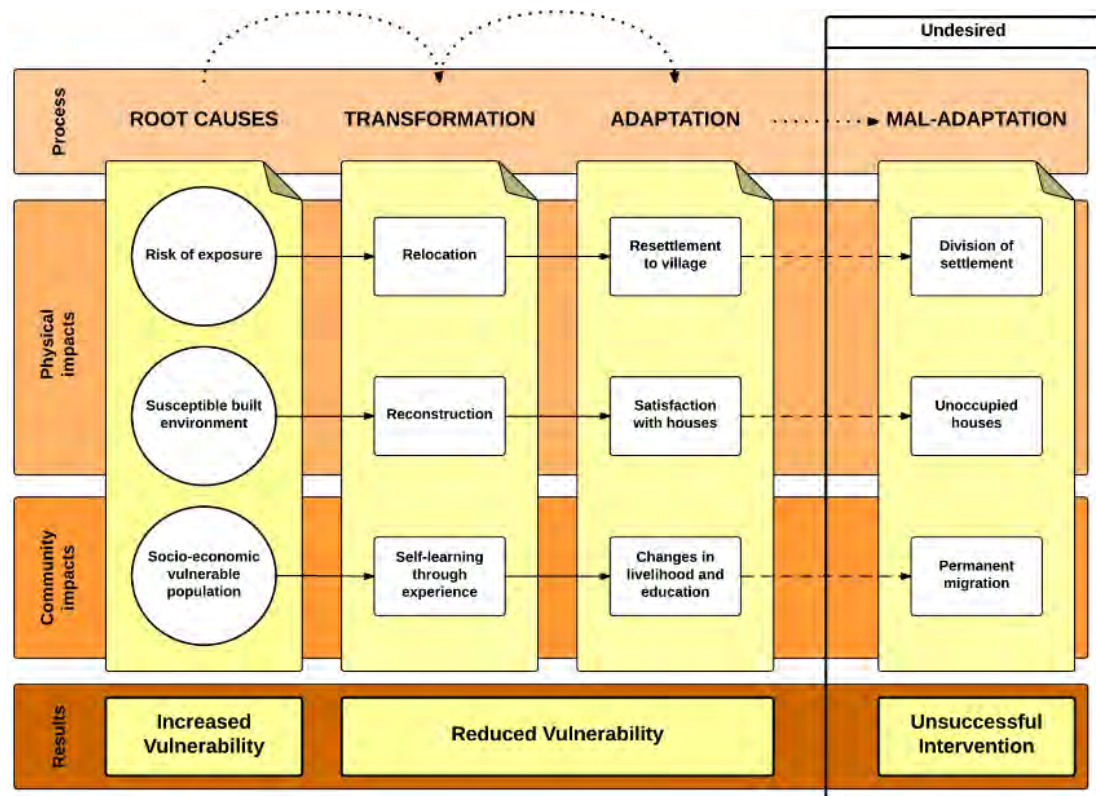


Figure 7.1: The process scheme of the research themes conceptualised in Chapter 1.

To explain, a natural hazard, i.e. earthquakes in the context of the study, turns into a disaster as a result of the existing root causes that increase vulnerability. Thus, each root cause is attempted to be solved through transformative decisions such as relocation of the settlements exposed, approaches to reconstruction to decrease the susceptibility of the built environment, and the results of self-learning at individual and communal level. Accordingly, adaptation follows transformation in all of these aspects that on one hand may end up with full resettlement of dwellers to the relocated villages, high satisfaction of the dwellers with their post-earthquake houses, and positive changes in socio-economic aspects that mainly includes

multiplied source of income in a household to secure less vulnerable livelihood and understanding the importance of education at gaining employability skills and accessing various job opportunities, which in turn, decrease the desperateness of the dwellers in case of a disaster. On the other hand, adaptation may turn into mal-adaptation that the settlement exposed might be relocated partially as a part of dwellers did not wish to be relocated. Thus, when the projects are implemented without consulting or without learning from the beneficiaries, the result is generally a number of unoccupied houses in a relocation site. Furthermore, from socio-economic aspects, permanent migration also should be deemed as the results of mal-adaptation since it shows that the transformative decisions made have not been responsive and accurate to the needs of local people as they have preferred to migrate out, not to struggle with the impacts of disaster and lacking solutions as well as to recover as quickly as possible. Nevertheless, such results of adaptation and mal-adaptation describe what parts of the post-disaster intervention scheme are successful in reducing vulnerability and what parts make the intervention unsuccessful.

Objective 5: *To draw suggestions allowing the inclusion of user-input in the reconstruction process to improve the effectiveness of the post-disaster housing strategy of the state.*

As the final objective of the study, this involves formative evaluation of the study findings. Formative evaluations assess the project or programme, and seek ways improvements can be undertaken to enhance the implementation of the project or the programme. To this end, with reference to the literature review that established the theoretical concept of how a promising disaster recovery should be and the findings of the study that apply to general as well as to exceptional cases, an abstraction of the existing post-earthquake intervention scheme for housing was illustrated and a set of theoretical and practical suggestions are made and explained through the illustration.

To explain Figure 7.2, basically, it can be said that the state authorities in Turkey focused more on disaster response and recovery in terms of post-earthquake intervention. However, the process of damage assessment has insufficiencies as the study revealed the cases in which the beneficiaries suffer from the results. Lack of trained personnel to conduct the assessments properly, inappropriate damage assessment and lacking methods and documentation, and the assessment regardless of the conditions of rural life are the main problems in the process.

Since the completed damage assessment forms are used to identify the beneficiaries, a problem starting at this point continues till the end of the reconstruction process. For example,

identifying a dweller as the beneficiary of only a house or only a barn leaves people in challenging conditions afterwards. Moreover, a misconduct assessment followed by mistaken relocation decisions ends with the division of a settlement, which is apparently not a preferred outcome.

With the examination of three implementations in different provinces, it also can be concluded that the state authorities deem the completion of the reconstruction process as the last stage of recovery, so as illustrated. However, it has long been discussed that the success of post-disaster reconstruction is based more on the extent of what it addressed rather than simple delivery of the projects. Despite this, since the state authorities in Turkey neglect the period after the completion of reconstruction, they keep the same plans on the shelf for another post-earthquake housing implementation, or rapidly develop new models without knowing the possible outcomes. That is, as seen from the examples of the study, the authorities implemented each project differently, without learning from the previous examples and rather experimentally, indeed.

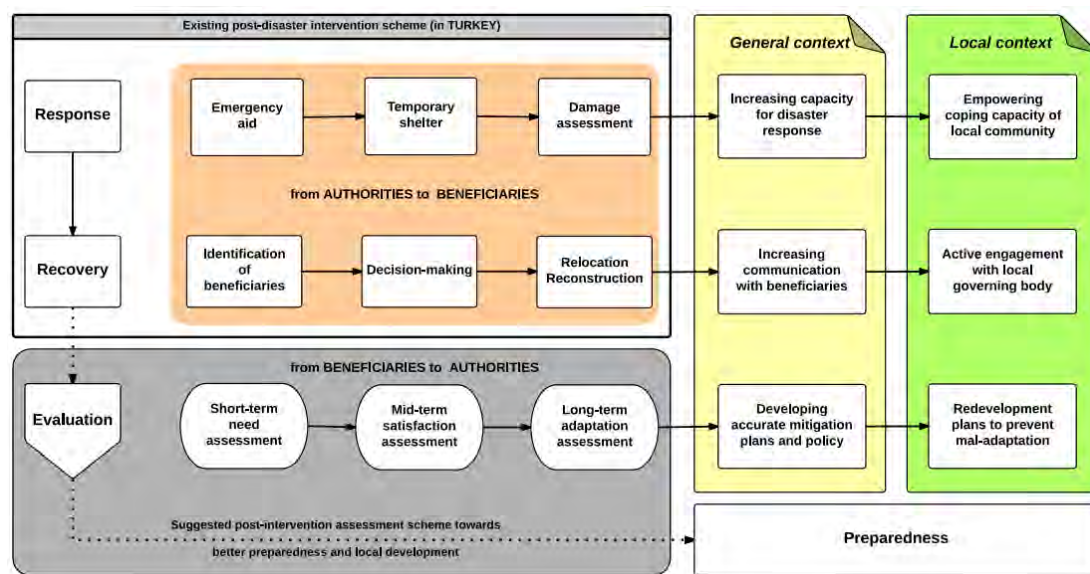


Figure 7.2: The suggested processes of evaluation and the use of outcomes of the assessments (Author).

In recent years, a key approach was developed, which is post-implementation *monitoring and evaluation*. It is deemed that this approach would not only assist to address the needs of the dwellers, but also would provide a learning process that can also assist in the improvement of interventions and implementations. In this regard, as the study employed the similar approach when establishing the research and thereby accomplished to gather valuable data and findings, into the abstract illustration of the post-disaster intervention scheme employed in Turkey, an

evaluation stage was schematised as the following stage of the recovery and with the purpose of *learning from beneficiaries*, in the way the study did. However, as was also understood from the findings of the study, evaluation needs to be carried out in a longitudinal fashion. In this regard, adapting the several models in the literature including CURBE, UNCHS and the World Bank, the suggested evaluation stage was divided into three continuous processes.

When a *short-term need assessment* is conducted on a post-earthquake reconstruction project, it will help to discover what the beneficiaries need following their resettlement, which will assist to detect the deficient sides of disaster aid and recovery. As this process should be conducted in the early aftermath of the project delivery, the *mid-term satisfaction assessment* should be conducted at least one year after the delivery as this period will give time for the dwellers to adapt themselves to the houses and to recognise the sufficient and insufficient parts of the implementation. This process will assist better design of the house plans and settlements. Besides, within this process, it can control the quality of the construction work that the contractors completed and the incomplete parts of the projects can be recovered. Particularly, this will prevent the dwellers from living in poorly constructed houses. Based on the experience in the study, the *long-term adaptation assessment* should be conducted at least after a decade and may extend to two decades as well. This process is to explore the socio-economic changes of the communities affected by a disaster. Especially, if the case study of Erzincan was not included in the study, the findings would not be addressing the question of the research. Similarly, if the case study of Erzurum was not included in the study, the transition step of the socio-economic adaptation of the communities would not be captured. This means, as highlighted earlier, disasters inevitably initiate the process of change that is beyond the built environment. After all, this monitoring of an implementation in such longitudinal approach will assist the authorities to develop better policies and redevelopment plans, which might prevent dwellers from migrating out of the area permanently, for example.

7.3 Recommendations

In the light of the research conduct and findings, the following recommendations can be made to bring further understandings to the post-earthquake reconstruction process in Turkey as well as in other countries.

Firstly, the research conducted primarily aimed to reflect the viewpoint of the rural dwellers and evaluate the post-earthquake permanent housing projects from their perspective. To link the themes of adaptation and transformation within the context of the study, the researcher

reflected her understandings from the field that she had visited several times throughout the study. However, the findings regarding the reconstruction approach pointed to problems caused by the contractors involved in the reconstruction process and referred to the irresponsibility of the authorities in terms of leaving the dwellers alone with the contractors, and thus, the work completed was of poor quality for most. Due to time limitations and the scope of the research, the study did not branch into the parties in these positions. In this regard, it is suggested to seek the perspective and the competence of such stakeholders involved in the post-earthquake reconstruction in the villages examined in this study. This would complete the evaluation of the implementation from all parties.

Secondly, according to the suggestion made to the existing intervention scheme, a study is suggested in the first place to observe the progress of change in the rural Van reconstructed after the 2011 earthquakes. This study can adopt the long-term adaptation assessment approach and together with the findings of this study, it can clarify whether the rural pattern in the province is changed as it was foreseen in this study. A similar study can also be conducted for the villages reconstructed after the 2004 earthquakes in the province of Erzurum, particularly in a decade's time, to find out whether the transition of the rural environment and population has turned out as mentioned in this study. Both research suggestions can explore how the regional dynamics change in time in terms of the attractiveness of the urban area in Van and Erzurum, and the demographic change in their rural population, which are, to remind, expected to happen as that observed in Erzincan in this study.

Thirdly, in order to enrich the understanding of the effects of earthquakes on the rural areas of the region, a similar study with the same method and scope can be conducted by including the (1st May) 2003 Bingöl earthquake and (8th March) 2010 Elazığ earthquake. For example, the study may only focus on these two examples and may use the data of Erzincan of this study as secondary data to compare the findings, which may verify or contrast to the assumptions made in the study.

Another suggestion is to conduct a research that aims to explore the vision and opinions of the dwellers living in the traditional natural settings about the transformative post-earthquake houses of the state, and by taking a further level, the method used in this study, to compare with that of the dwellers living in the rural settlements built after earthquakes in the region. The study conducted made an observational research with the aim of comparing the change in the

built environment. However, the kind of study suggested may bring more empirical qualitative data in terms of comparing the perspectives of two kinds of rural communities in the region.

In the simplest way, a further study can be conducted by focusing on the same provinces in this study but by examining different villages reconstructed after the earthquakes. This kind of study would completely assist to compare and to refine the observations and the findings of this study, and more importantly, would expand the regional exploration since the region studied is quite understudied and underrepresented in the world of academia. Moreover, such studies suggested above would also assist the state authorities to better develop regional redevelopment plans and refine the policies regarding the post-earthquake permanent housing policies.

Finally, since theoretical and methodological approaches developed in this study were highly fruitful in bringing a handful of findings, a similar study can be conducted in a different disaster-prone country by establishing its start point on the themes of change, transformation, and adaptation and may adopt a similar design of mixed-methods research.

7.4 Concluding remarks

This study researched the post-earthquake permanent housing implementations in rural eastern Turkey and evaluated the effectiveness of the projects from the perspective of the dwellers. The Eastern Anatolian Region was selected as the target area of the study. Given the lack of research interest about the region and lack of academic and official documentation from the area, it is hoped that the study conducted has contributed to this gap and raised an interest about the area and the region. Besides, the findings are also hoped to be taken into consideration by the state authorities as the researcher will attempt to deliver the study to the corresponding parties, which is the suggested approach in disaster studies that should address balancing the theoretical knowledge and practical outcomes. To spread the findings and the knowledge concluded in the study, further publishing will be made as well, and by that it is hoped to bring the theoretical and methodological approaches adopted in this study into the network of the researchers in an attempt to increase the scope of disaster studies.

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The English copy of the questionnaire page#1

DATE:	
NUMBER OF PARTICIPANT:	
GENERAL INFORMATION	
1-Total number of the household members	[]
2-Number of children	[]
3-Age group of the household members	☐ under 18 ☐ 18-34 ☐ 35-49 ☐ 50-65 ☐ 65+
4-Highest education level in the family	☐ Primary ☐ Secondary ☐ High school ☐ University
5-Type of occupancy	☐ Householder ☐ Tenant ☐ Relative of the householder
6-How many years have you lived in this house?	☐ less than 1 year ☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 20+
7-Which earthquakes did you experience?	☐ 1976 ☐ 2011 (VAN) ☐ 1992 (ERZINCAN) ☐ 1983 ☐ 2004 (ERZURUM)
8-What was the level of damage of your previous house?	☐ Damaged ☐ Heavily damaged ☐ Collapsed
9-Did you lose any family member in the earthquake you experienced?	☐ Yes ☐ No
10-Did you stay in tent-camps temporarily after the earthquake?	☐ Yes ☐ No ☐ Not Applicable
If you stayed, for how long?	☐ 0-6 months ☐ 7-12 months ☐ 12+ months ☐ Do not remember ☐ Not Applicable
If you did not stay, where did you stay at?	

OVERALL EVALUATION						
Please, indicate your level of satisfaction/agreement for the questions below.	Strongly disagreed/ dissatisfied				Strongly agreed/ satisfied	Not Applicable
	1	2	3	4	5	N.A
11-How much are you satisfied with your current house?						
12-Do you find your current house better than you had previously?						
13-How much do you prefer the structural system of your current house?						
14-How much do you prefer living in a traditionally built house?						
15-In what level were your expectations (before removing in) satisfied in your current house?						
16-How much do you wish to live in this house for the rest of your life?						
17-How well did the officials treat you during the delivery process?						
18-How much do you trust in the state after the completion of this project?						
19-Did you participate in decision making process for the design of your house and/or the relocation of your settlement?	☐ Yes ☐ No ☐ Not Applicable					
20-Do you have any issues to complain about the house or settlement or process?	☐ Yes ☐ No ☐ Not Applicable					

The English copy of the questionnaire page#2

PHYSICAL EVALUATION							
Residential unit	21-Which spaces do you have in your current house?	☐ Saloon/Living room ☐ Kitchen ☐ Bathroom ☐ Toilet ☐ Bedroom ☐ Bedroom ☐ Bedroom ☐ Basement ☐ Storage ☐ Terrace					
	Please, indicate your level of satisfaction/agreement for the statements below.	Strongly disagreed/dissatisfied				Strongly agreed/satisfied	Not Applicable
		1	2	3	4	5	N.A
	22-Size of house and rooms						
	23-Size of windows						
	24-Size of your private lot						
	25-Quality of finishing materials used for interiors						
	26-Direction of entrance, terrace and garden						
	27-Level of your privacy						
	28-Easy cleaning						
29-Heating and ventilating during winter season							
Settlement	Please, indicate your level of satisfaction/agreement for the statements below.	Strongly disagreed/dissatisfied				Strongly agreed/satisfied	Not Applicable
		1	2	3	4	5	N.A
	30-Location of your unit in the settlement						
	31-Location of new settlement comparing to the previous one						
	32-Distance to the city centre and other services						
	33-Design of new settlement and outdoor facilities provided						
	34-Infrastructure (road, sewage, etc.) and public services (school, mosque, health centre, etc.)						
Additional units	35-Which additional units do you have in your private lot?	☐ Barn ☐ Hayloft ☐ Baking room ☐ Storage for wood ☐ Hencoop ☐ None					
	Which one did you receive from the state?						
	If you built/rebuilt any of them, when did you build it?						
	Please, indicate your level of satisfaction/agreement for the statements below.	Strongly disagreed/dissatisfied				Strongly agreed/satisfied	Not Applicable
		1	2	3	4	5	N.A
36-Size and location of barn							
Alterations	37-Have you done any alterations in your house?	☐ Yes ☐ No ☐ Not Applicable					
	If yes, in which spaces did you do this modification?	☐ Saloon/Living room ☐ Kitchen ☐ Bathroom ☐ Toilet ☐ Bedroom ☐ Bedroom ☐ Bedroom ☐ Basement ☐ Storage ☐ Terrace					
	If yes, what did you change in these spaces?	☐ Window ☐ Door ☐ Floor ☐ Other					
	If yes, when did you do these alterations?						
	Please, indicate your level of satisfaction/agreement for the statements below.	Strongly disagreed/dissatisfied				Strongly agreed/satisfied	Not Applicable
		1	2	3	4	5	N.A
	38-You maintain your house by doing these alterations						
	39-You do these alterations because you need to						
40-You will do further alterations in your house in future							

The English copy of the questionnaire page#3

SOCIAL EVALUATION							
Awareness of Disasters	41-Have you been trained or have you ever participated in a disaster informing programme?	☐ Yes ☐ No ☐ Do not remember					
	Please, indicate your level of satisfaction/agreement for the statements below.	Strongly disagreed/dissatisfied				Strongly agreed/satisfied	Not Applicable
		1	2	3	4	5	N.A
	42-You were very scared of the earthquake and did not know how to act in and after an earthquake						
	43-You have never imagine your house could collapse						
	44-You feel safer now and believe in seismic-resistant of your current house						
	45-You are still scare of earthquakes						
Migration problem	46-Did you or any of your family members migrate temporarily after the earthquake?	☐ Yes ☐ No ☐ Not applicable					
	If yes, how long was this temporarily migration?	☐ 0-6 months ☐ 7-12 months ☐ 12+ months ☐ Still away (for the member of the family)					
	47-Have you ever considered to migrate permanently to another city after the earthquake?	☐ Yes ☐ No ☐ Not applicable					
	If yes, why and to where?						
	48-Did your idea change after resettling to your current house?	☐ Yes ☐ No ☐ Still not sure ☐ Not applicable					
Neighbourhood	49-Do you know all of your neighbours?	☐ Yes ☐ No					
	Are you all from the same village?	☐ Yes ☐ No					
	Please, indicate your level of satisfaction/agreement for the statements below.	Strongly disagreed/dissatisfied				Strongly agreed/satisfied	Not Applicable
		1	2	3	4	5	N.A
	50-You meet your neighbours very often						
	51-You help each other whenever one of you needs						
	52-Their existence is important to you and makes you feel like nothing changed after the earthquake						
	53-Even they received different amount of financial help or size of house, it does not bother me						
Daily life	54A-Do you feel your life coming back to normal?	☐ Yes ☐ No					
	54B-Did your life come back to normal?	☐ Yes ☐ No					
	55-For how long has your life been disrupted after the earthquake?	☐ 0-6 months ☐ 7-12 months ☐ 12+ months ☐ Do not remember					
	56-What habits of yours have changed according to the current house and settlement?						
	57-Are your residential and additional units in same village?	☐ Yes ☐ No					
	If no, which is where?						
	If no, what difficulties do you have?						
	Please, indicate your level of satisfaction/agreement for the statements below.	Strongly disagreed/dissatisfied				Strongly agreed/satisfied	Not Applicable
		1	2	3	4	5	N.A
	58-Your current living standard is better than the earlier						
	59-You miss your former house and settlement						
	60-You may consider leaving your current house in future						

The English copy of the questionnaire page#4

ECONOMICAL EVALUATION							
Loans	61-Did/Do you receive any financial help from the state other than the house loan?	☐ Yes ☐ No ☐ Not applicable					
	62-What is the completion level of your house loan?	☐ Not started yet ☐ 0-5 years ☐ 6-10 years ☐ 11-19 years ☐ 20 (Completed)					
	Please, indicate your level of satisfaction/agreement for the statements below.	Strongly disagreed/dissatisfied				Strongly agreed/satisfied	Not Applicable
		1	2	3	4	5	N.A
	63-Duration of the loan is too long to pay back						
	64-Amount of the instalments is very high						
	65-You have difficulties to collect the money monthly						
	66-Your relatives help/may help you for the instalments						
	67-You would prefer 6 months/annual payments rather than monthly instalments						
	68-Documents and paperwork in receiving the house was clear and transparent						
69-The quality of the house you receive worth the amount of the loan							

Livelihood	70-Which one is your current livelihood based on?	☐ Animal husbandry ☐ Agriculture ☐ Other (Please, specify. _____)				
	71-Did you lose your animal stock in the earthquake?	☐ Yes ☐ No ☐ Not applicable				
	72-Did you become unemployed after the earthquake?	☐ Yes ☐ No ☐ Not applicable				
	If yes, for how long?	☐ 0-6 months ☐ 7-12 months ☐ 12+ months ☐ Still unemployed				
	73-Did you apply for credit from the state to restart your animal husbandry?	☐ Yes ☐ No ☐ Not applicable				
	74-Is your current income at same level with the earlier?	☐ Yes ☐ No ☐ Not applicable				

Expenses	75-Please, put in order your essential expenses	☐ Instalment ☐ Kitchen ☐ Heating ☐ Other bills					
	76-What type of heating do you have?	☐ Wood ☐ Coal ☐ Gas ☐ Fuel-oil ☐ Electricity ☐ Turd					
	Please, indicate your level of satisfaction/agreement for the statements below.	Strongly disagreed/dissatisfied				Strongly agreed/satisfied	Not Applicable
		1	2	3	4	5	N.A
	77-You think heating expenses are very high						
	78-You can afford all the essential expenses						
	79-Your expenses increased since you removed in this house (comparing to the former house)						
80-You think you spend/spent too much for alterations and modifications in the house							

...You have completed the questionnaire...

The Turkish print of the questionnaire page#1

Köy adı/Şehir:/.....

TARİH: / / 2013

KATILIMCI NUMARASI:

GENEL BİLGİLER	
1-Ailenin nüfusu	[]
2-Çocuk sayısı	[]
3-Bireylerin yaş grupları	☐ 18 yaş altı ☐ 18-34 ☐ 35-49 ☐ 50-65 ☐ 65 üstü
4-Aile içindeki en yüksek eğitim seviyesi	☐ İlkokul ☐ Ortaokul ☐ Lise ☐ Üniversite
5-Mülkiyet tipi	☐ Ev sahibi ☐ Kiracı ☐ Akraba (kira vermiyor) ☐ Akraba (kira veriyor)
6-Kaç yıldır bu evde oturuyorsunuz?	☐ 1 yıldan az ☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 20'den fazla
7-Hangi depremleri yaşadınız?	☐ 1976 ☐ 2011, 23 Ekim ☐ 2011, 9 Kasım (VAN) ☐ 1992 (ERZİNCAN) ☐ 1983 ☐ 2004 (ERZURUM)
8-Önceki evinizin hasar derecesi ne idi?	☐ Hasarlı ☐ Ağır hasarlı ☐ Yıkılmış ☐ Uygun değil
9-Depremden dolayı herhangi bir aile ferdinizi kaybettiniz mi?	☐ Evet ☐ Hayır
10-Deprem sonrasında geçici olarak çadırda veya konteynırda kaldınız mı?	☐ Evet ☐ Hayır ☐ Uygun değil
Eğer kaldıysanız, ne kadar süreyle?	☐ 0-6 ay ☐ 7-12 ay ☐ 12 aydan fazla ☐ Hatırlamıyorum ☐ Uygun değil
Eğer kalmadıysanız, nerede konakladınız? (Belirtiniz)	

GENEL DEĞERLENDİRME						
Lütfen, aşağıdaki sorular için memnuniyet/kabul etme durumunuzu yanda verilmiş olan seviyelerden seçerek belirtiniz.	Kesinlikle katılmıyorum/ memnun değilim				Kesinlikle katılıyorum/ memnunuz	Uygun değil
	1	2	3	4	5	U.D
11-Deprem konutumdan memnunuz.						
12-Deprem konutumu önceki konutumdan daha iyi buluyorum.						
13- Deprem konutumun yapım sistemini, yani betonarme olmasını tercih ediyorum.						
14-Yerel malzeme ile inşa edilmiş bir konutta oturmayı tercih ederdim.						
15-Deprem konutum, taşınmadan önceki konfor beklentilerimi taşıdıktan sonra karşıladı.						
16-Hayatım boyunca bu evde oturmayı arzu ederim.						
17-Deprem konutunun inşası ve teslim edilmesi sürecinde görevlilerinin davranışından memnun kaldım.						
18-Deprem sonrasında, yeniden konut edinmemizde devletin görevini yerine getirdiğini düşünüyorum.						
19-Deprem konutumun planlanması ve/veya köy yerleşkesinin değiştirilmesi kararlarının verilmesi sürecine dahil oldum.						
20-Deprem konutum, köy yerleşkesi veya deprem sonrası sürecin tümü ile ilgili bazı şikayetlerim var.						

The Turkish print of the questionnaire page#2

FİZİKSEL DEĞERLENDİRME							
Konut birimi	21-Deprem konutunuzda hangi birimler mevcut?	☐ Salon/Oturma odası ☐ Mutfak ☐ Banyo ☐ Tuvalet ☐ Yatak odası ☐ Yatak odası ☐ Yatak odası ☐ Bodrum ☐ Depo ☐ Teras					
	Lütfen, aşağıdaki birimler için memnuniyet durumunuzu yanda verilmiş olan seviyelerden seçerek belirtiniz.	Kesinlikle memnun değilim				Kesinlikle memnunuz	Uygun değil
	22-Evin ve odaların genişliği	1	2	3	4	5	U.D
	23-Pencerelerin genişliği						
	24-Size verilen arsanın genişliği (yeni yerleşme ise*)						
	25-Konut içinde kullanılan malzemelerinin kalitesi						
	26-Girişin, terasın ve bahçenin bakış yönü						
	27-Mahremiyet seviyesi						
	28-Kolay temizleme						
	29-Kış mevsimi boyunca ısıtma ve havalandırma						
Köy yerleşkesi	30-Konutunuzun köy yerleşkesi içindeki konumu						
	31-Yeni yerleşkenin öncekine göre konumu						
	32-Şehir merkezine ve diğer hizmetlere mesafesi						
	33-Yeni yerleşkenin planı ve açık alan aktivite alanları (kameriye, çocuk parkı vb.)						
	34-Altyapı (yol, su, kanalizasyon vb.) ve kamu hizmetleri (okul, cami, postane, hastane vb.)						
Ek birimler	35-Hangi ek birimlere sahipsiniz	☐ Ahır ☐ Samanlık ☐ Tandır yeri ☐ Odun deposu ☐ Kümes ☐ Hiçbiri					
	Hangi birimi devletten deprem konutunuz ile birlikte aldınız?						
	Eğer kendiniz inşa ettiyseniz, ne zaman inşa ettiniz?						
	Lütfen, aşağıdaki birim için memnuniyet durumunuzu yanda verilmiş olan seviyelerden seçerek belirtiniz.	Kesinlikle memnun değilim				Kesinlikle memnunuz	Uygun değil
	36-Ahırın genişliği ve konumu	1	2	3	4	5	U.D
Değişiklikler	37-Deprem konutunuzda herhangi bir değişime yaptınız mı?	☐ Evet ☐ Hayır ☐ Uygun değil					
	Eğer yaptıysanız, hangi birimlerde?	☐ Salon/Oturma odası ☐ Mutfak ☐ Banyo ☐ Tuvalet ☐ Bodrum ☐ Depo ☐ Teras ☐ Yatak odası ☐ Yatak odası ☐ Yatak odası					
	Neyi değiştirdiniz?	☐ Pencere ☐ Kapı ☐ Döşeme ☐ Diğer					
	Ne zaman bu değişikliği yaptınız?						
	Lütfen, aşağıdaki durumlar için kabul etme durumunuzu yanda verilmiş olan seviyelerden seçerek belirtiniz.	Kesinlikle katılmıyorum				Kesinlikle katılıyorum	Uygun değil
	38-Bu değişiklikleri konutumda bakım için yapıyorum.	1	2	3	4	5	U.D
	39- Bu değişiklikleri ihtiyacım olduğu için yapıyorum.						
	40-Gelecekte konutumda daha farklı değişiklikler yapmayı düşünüyorum.						

The Turkish print of the questionnaire page#3

SOSYAL DEĞERLENDİRME							
Afet bilinci	41-Herhangi bir afet hakkında bilgilendirme programına katıldınız mı veya eğitim aldınız mı?	☐ Evet ☐ Hayır ☐ Hatırlamıyorum ☐ Uygun değil					
	Lütfen, aşağıdaki durumlar için kabul etme durumunuzu yanda verilmiş olan seviyelerden seçerek belirtiniz.	Kesinlikle katılmıyorum				Kesinlikle katılıyorum	Uygun değil
		1	2	3	4	5	U.D
	42-Deprem sırasında ve sonrasında ne yapacağımı bilmiyordum ve depremden çok korkmuştum.						
	43-Evimin yıkılacağını hiç düşünmemiştim.						
	44-Mevcut deprem konutumun depreme dayanıklılığına güveniyorum ve kendimi daha güvende hissediyorum.						
	45-Depremlerden hala çok korkuyorum.						
Göç problemi	46-Deprem sonrasında siz veya herhangi bir aile ferdiniz geçici olarak göç etti mi?	☐ Evet ☐ Hayır ☐ Hatırlamıyorum ☐ Uygun değil					
	Evet ise, bu geçici göçün süresi ne kadar idi?	☐ 0-6 ay ☐ 7-12 ay ☐ 12 aydan fazla ☐ Hala dönmedi (aile ferdi için)					
	47-Deprem sonrasında hiç kalıcı olarak başka bir şehre göç etmeyi düşündünüz mü?	☐ Evet ☐ Hayır ☐ Hatırlamıyorum ☐ Uygun değil					
	Evet ise, neden ve nereye?						
	48-Deprem konutunuza yerleştikten sonra bu düşünceden vazgeçtiniz mi?	☐ Evet ☐ Hayır ☐ Hala emin değilim. ☐ Uygun değil					
Komşuluk ilişkileri	49-Bütün komşularınızı tanıyor musunuz?	☐ Evet ☐ Hayır					
	Hepiniz aynı köyden misiniz? (yeni yerleşme ise*)	☐ Evet ☐ Hayır					
	Lütfen, aşağıdaki durumlar için kabul etme durumunuzu yanda verilmiş olan seviyelerden seçerek belirtiniz.	Kesinlikle katılmıyorum				Kesinlikle katılıyorum	Uygun değil
		1	2	3	4	5	U.D
	50-Komşularım ile çok sık buluşurum.						
	51-Herhangi birimizin ihtiyacı olduğunda yardım ederim.						
	52-Komşularımın çevremde olmaları benim için önemli ve bana deprem sonrasında hiçbir şey değişmemiş hissi veriyor.						
	53-Komşularımın devletten farklı miktarda maddi yardım veya farklı genişlikte konut alması beni rahatsız etmiyor.						
Günlük yaşam	54-Yaşamınızın normale döndüğünü hissediyor musunuz?	☐ Evet ☐ Hayır					
	55-Deprem sonrasında gündelik yaşantınız ne kadar süreyle aksadı?	☐ 0-6 ay ☐ 7-12 ay ☐ 12 aydan fazla ☐ Hatırlamıyorum					
	56-Mevcut konut ve yerleşkeye bağlı olarak hangi alışkanlıklarınız değişti?						
	57-Konut ve ek birimleriniz aynı köy yerleşkesinde mi?	☐ Evet ☐ Hayır					
	Hayır ise, hangi birim nerede?						
	Lütfen, aşağıdaki durumlar için kabul etme durumunuzu yanda verilmiş olan seviyelerden seçerek belirtiniz.	Kesinlikle katılmıyorum				Kesinlikle katılıyorum	Uygun değil
		1	2	3	4	5	U.D
	58-Mevcut yaşam standartlarım öncesine göre daha iyi.						
	59-Önceki konut ve köy yerleşkesini özleyorum.						
	60-Mevcut evimi gelecekte boşaltmayı düşünebilirim.						

The Turkish print of the questionnaire page#4

EKONOMİK DEĞERLENDİRME							
Krediler	61-Ev kredisi dışında devletten herhangi bir maddi yardım alıyor musunuz?/ aldınız mı?	☐ Evet ☐ Hayır ☐ Uygun değil					
	62-Aldığınız ev kredisinin geri ödemesinin ne kadarını tamamladınız?	☐ Ödemeler henüz başlamadı ☐ 0-5 yıl ☐ 6-10 yıl ☐ 11-19 yıl ☐ 20 (Tamamlandı)					
	Lütfen, aşağıdaki durumlar için kabul etme durumunuzu yanda verilmiş olan seviyelerden seçerek belirtiniz.	Kesinlikle katılmıyorum				Kesinlikle katılıyorum	Uygun değil
		1	2	3	4	5	U.D
	63-Kredinin geri ödeme süresi çok uzun.						
	64-Aylık ödeme tutarı çok yüksek.						
	65-Aylık ödemeler için para biriktirmekte zorlanıyorum.						
	66-Aylık ödemelerde zorlandığımda akrabalarım bize yardım eder/edebilir.						
	67-Aylık ödeme planı yenne 6 ayda bir veya yılda bir ödeme planını tercih ederdim.						
	68-Deprem konutunun teslim edilmesindeki süreçte bürokratik işlemler ve belgeler anlaşılabilir ve şeffaftı.						
69-Teslim aldığım deprem konutunun kalitesi, karşılığında ödediğim ev kredisinin miktarına değer.							
Geçim kaynağı	70-Mevcut geçim kaynağınız hangisi?	☐ Hayvancılık ☐ Tarım ☐ Diğer (Lütfen, belirtiniz. _____)					
	71-Depremde hayvan stoğunuzda kayıplar oldu mu?	☐ Evet ☐ Hayır ☐ Uygun değil					
	72-Deprem sonrasında işsiz kaldınız mı?	☐ Evet ☐ Hayır ☐ Uygun değil					
	Evet ise, ne kadar sürdü?	☐ 0-6 ay ☐ 7-12 ay ☐ 12 aydan fazla ☐ Hala işsiz					
	73-Hayvancılığa yeniden başlamak için, devletten kredi aldınız mı?	☐ Evet ☐ Hayır ☐ Uygun değil					
	74-Mevcut aylık geliriniz deprem öncesi ile aynı mı?	☐ Evet ☐ Hayır ☐ Uygun değil					
Harcamalar	75-Lütfen, temel harcamalarınızı 1'den 4'e sıralayınız.	☐ Kredi ödemesi ☐ Mutfak ☐ Isınma ☐ Diğer giderler					
	76-Isınma türünüz hangisi?	☐ Odun ☐ Kömür ☐ Gaz ☐ Yağ ☐ Elektrik ☐ Tezek					
	Lütfen, aşağıdaki durumlar için kabul etme durumunuzu yanda verilmiş olan seviyelerden seçerek belirtiniz.	Kesinlikle katılmıyorum				Kesinlikle katılıyorum	Uygun değil
		1	2	3	4	5	U.D
	77-Isınma giderimizin çok olduğunu düşünüyorum.						
	78-Bütün temel harcamalarımızı karşılayabiliyoruz.						
	79-Deprem konutuna taşındığımızdan beri harcamalarımızın arttığını düşünüyorum.						
80-Konutumuzda yaptığım/yapacağım değişiklikler/eklemeler için çok para harcadığımı/harcayacağımı düşünüyorum.							

...Anketi tamamladınız. Teşekkür ederim...

The English copy of the semi-structured interview questions (1 page only)

SEMI-STRUCTURED INTERVIEW QUESTIONS FOR THE PARTICIPANTS

OVERALL EVALUATION

1. When did you receive your house from the state?
Do you think it took longer than you expected?
2. Are/were you happy with the contractor-based state-built reconstruction system?
Would you prefer to rebuild your post-earthquake permanent house on your own by only receiving financial help from the state?
3. Are you happy with living in this type of house or would you prefer the traditionally built style? Why?

PHYSICAL EVALUATION

4. (If) There are some features of your house that you are dissatisfied with. Can you elaborate them? Why do you feel/think so?
5. Could you say that you adapted successfully to this house and settlement (or relocation)?
If yes, what did you do to achieve this?
If not, what causes do make you feel so? Is this related to physical issues or personal/private issues?
6. Would you prefer to modify this house by adding a room when your son/daughter gets married, or would you build a new house near to yours on your own?

SOCIAL EVALUATION

7. Do you have any relatives migrated permanently after the earthquake?
Are you in touch with them?
Do they influence you in decision-making?
8. Can you summarise a typical day in your house?
Is there any recognisable change compared to your pre-earthquake life?

ECONOMICAL EVALUATION

9. How did the earthquake affect your economical conditions?
How many people have regular income in your family now?
10. Do you feel disadvantaged because your income is based on animal husbandry and/or agriculture?
If you are employed in a different vocation, what type of job is this? Do you work there as part-time or full-time?

The Turkish print of the semi-structured interview questions (1 page only)

KATILIMCILAR İÇİN GÖRÜŞME SORULARI LİSTESİ

GENEL DEĞERLENDİRME

1. Evinizi devletten ne zaman teslim aldınız?
Evin size teslimi düşündüğünüzden daha uzun zaman mı aldı?
2. Müteahhit anlaşmalı devlet-eliyle yeniden inşa yönteminden memnun kaldınız mı?
Yıkılan evinizi devletten sadece maddi yardım olarak kendiniz yeniden inşa etmek ister miydiniz?
3. Bu tip bir evde oturmaktan memnun musunuz yoksa geleneksel şekilde yerel malzeme ile inşa edilmiş bir konut mu tercih ederdiniz? Neden?

FİZİKSEL DEĞERLENDİRME

4. Eğer, konutunuzda memnun olmadığınız özellikler varsa, bunları biraz açabilir misiniz? Neden böyle düşünüyorsunuz/hissediyorsunuz?
5. Bu deprem konutuna ve köy yerleşkesine tümüyle uyum sağlayabildiğinizi söyleyebilir misiniz?
.Evet ise, bunu başarmak için ne yaptınız?
.Hayır ise, neler size olumsuz geliyor? Konutun ilgili fiziksel özellikleri mi yoksa sizin kişisel/özel durumunuz mu bununla ilgili?
6. Oğlunuz/Kızınız evlendiğinde bu konuta yeni bir oda mı eklersiniz yoksa konutunuzun yakınında kendiniz yeni bir ev mi inşa edersiniz?

SOSYAL DEĞERLENDİRME

7. Depremden sonra kalıcı olarak göç etmiş akrabalarınız var mı?
Onlarla görüşüyor musunuz?
Göç konusunda sizin düşüncelerinizi etkiliyorlar mı?
8. Bir gününüzü özetleyebilir misiniz?
Sizce deprem öncesine göre çokça farklı bir değişiklik var mı yaşadınızda?

EKONOMİK DEĞERLENDİRME

9. Deprem ekonomik durumunuzu nasıl etkiledi?
Şu anda ailenizde kaç kişi aylık düzenli bir gelire sahip?
10. Geçim kaynağınız hayvancılık ve/veya tarıma dayalı olduğu için kendinizi dezavantajlı konumda görüyor musunuz?
Farklı bir alanda çalışıyorsanız, bu ne tür bir iş? Tam zamanlı mı yoksa yarı zamanlı mı çalışıyorsunuz?

The list of the enumerated interviewees and the recording details

Enumeration of interviewee	Province	Village	Date of interview (dd/mm/yyyy)	Time of interview	Duration of interview (min.)
#1	Van	Gedelova	25/08/2013	05.10 pm	3:35
#2	Van	Gedelova	25/08/2013	05.34 pm	2:31
#3	Van	Gedelova	25/08/2013	06.23 pm	5:58
#4	Van	Gedelova	26/08/2013	10.13 am	6:45
#5	Van	Gedelova	26/08/2013	11.14 am	2:19
#6	Van	Gedelova	26/08/2013	11.52 am	3:32
#7	Van	Gedelova	26/08/2013	12.54 pm	3:00
#8	Van	Gedelova	26/08/2013	01.10 pm	2:49
#9	Van	Yalnızagaç	26/08/2013	03.44 pm	2:40
#10	Van	Yalnızagaç	26/08/2013	04.00 pm	2:39
#11	Van	Yalnızagaç	26/08/2013	04.34 pm	2:51
#12	Van	Yalnızagaç	26/08/2013	05.25 pm	2:33
#13	Van	Kozluca	27/08/2013	10.31 am	3:42
#14	Van	Kozluca	27/08/2013	10.48 am	6:09
#15	Van	Kozluca	27/08/2013	11.28 am	7:07
#16	Van	Kasimoğlu	27/08/2013	02.14 pm	11:31
#17	Van	Özkaynak	27/08/2013	03.25 pm	4:01
#18	Van	Özkaynak	27/08/2013	03.58 pm	2:48
#19	Van	Topaktaş	28/08/2013	10.22 am	2:43
#20	Van	Topaktaş	28/08/2013	10.43 am	3:06
#21	Van	Topaktaş	28/08/2013	11.49 am	3:04
#22	Erzurum	Çiğdemli	30/08/2013	10:12 am	2:08
#23	Erzurum	Çiğdemli	30/08/2013	11:28 am	3:00
#24	Erzurum	Tebrizcik	30/08/2013	03:11 pm	3:28
#25	Erzurum	Alaca	31/08/2013	10:24 am	3:02
#26	Erzurum	Alaca	31/08/2013	12:40 pm	2:20
#27	Erzurum	Alaca	31/08/2013	01:15 pm	2:39
#28	Erzurum	Tazegül	31/08/2013	04:18 pm	2:31
#29	Erzurum	Paşayurdu	01/09/2013	10:27 am	3:22
#30	Erzurum	Paşayurdu	01/09/2013	10:47 am	4:30
#31	Erzurum	Paşayurdu	01/09/2013	11:06 am	3:16
#32	Erzurum	Paşayurdu	01/09/2013	11:40 am	3:56
#33	Erzurum	Paşayurdu	01/09/2013	11:54 am	3:55
#34	Erzurum	Paşayurdu	01/09/2013	12:07 pm	2:55
#35	Erzincan	Altınbaşak	02/09/2013	12.20 pm	3:21

The English copy of the information hand-outs for the participants (1 page only)



Rural Transformation In Eastern Turkey: An Investigation of dwellers' adaptation to state-built post-earthquake permanent housing projects

This study is under supervision of:

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INFORMATION SHEET FOR PARTICIPANTS

This research is part of a PhD thesis at Queen's University Belfast, and investigates the dwellers' experiences in state-built post-earthquake permanent housing projects in Eastern Turkey. This study aims to find the problems that dwellers face in their houses. You have been selected for the current study due to being stay at an example of such projects in the selected area. Before you contribute to the study, you will be given this information sheet and a consent form in order to approve the collaboration between you and the researcher. You will be given a questionnaire with this form. You will also be asked to participate to an interview which depends on being volunteered.

The questionnaire generally includes the questions related to your current house and its conditions, your appreciation of your house, the problems and insufficiencies you have with your house, the preferences you have for a better house project, and general topics including physical and social environment and financial matters. If you are agreed to take apart in an interview, you will be asked similar questions but you are expected to elaborate your respond in-depth with your personal experiences.

There is no disadvantage for you if you decide to contribute to the study. Your data will only be used for the intention of this study. By accepting to participate, you will be helped to a research project which aims to represent the rural dwellers living in state-built post-earthquake permanent houses and help to develop better housing projects in future.

Your participation will be kept confidential, and only for the interviews, if you are agreed, your name will be used. Otherwise, every participant will be given a questionnaire numbered only, and the interviewees will also have an identifying numbers. Questionnaires you fill and, if you accept, the interview you give will be used as the data to derive results for the research topic. The results of the study primarily will be used for this doctoral study. In addition, the researcher will effort to make contacts to decision-makers in order to present them the outcomes of the study.

This research is primarily conducted and funded by the researcher. Any of commercial or state-bodies is out of this research currently. The process and the results of the survey conducted will be reviewed only by Queen's University Belfast faculty members. If you have further queries, you can contact the main conductor of the research.

Thank you for taking time to read this information leaflet.

The Turkish print of the information hand-outs for the participants (1 page only)



Danışmanlar:

Jason Von MEDING
Lecturer of Construction Management

Gul KACMAZ ERK
Lecturer in Architecture

Türkiye'nin doğusunda kırsal yerleşmelerde yapı çevrenin dönüştürülmesi:
Devlet tarafından yapılan deprem-sonrası kalıcı konut projeleri üzerine bir araştırma

Öğrencinin Adı: Didem Gunes YILMAZ
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KATILIMCILAR İÇİN BİLGİLENDİRME FORMU

Bu araştırma Queen's University Belfast'ta yürütülen doktora tezinin bir parçası olup, Türkiye'nin doğusunda depremler sonrasında devlet tarafından yapılan kalıcı afet konutlarında yaşayan ev sakinlerinin uyum sağlama deneyimlerini araştırmaktadır. Çalışmanın amacı ev sakinlerinin konutlarıyla ilgili problemleri ve karşılaştığı sorunları ortaya çıkarmaktır.

Yukarıda tarif edilen şekilde bir yerleşkede ikamet etmenizden dolayı çalışmaya seçilmiş bulunmaktasınız. Çalışma kapsamında yapılan ankete başlamadan önce bu form size sunulacak ve katılımınız için sözlü onayınız istenecektir. Bu form ile birlikte size anket verilecek. Anketi tamamladığınızda, devamında isteğe bağlı olarak gerçekleştirilecek olan görüşmeye katılmak isteyip istemediğiniz sorulacaktır.

Verilen anket genel olarak ikamet ettiğiniz deprem konutunuzun durumu, konuttan memnuniyetiniz, konuttaki yetersizlikler ve karşılaştığınız sorunlar, daha iyi bir konut için tercihleriniz, ve diğer çeşitli fiziksel, çevresel, sosyal ve ekonomik etkenleri kapsamaktadır. Görüşmeye devam etmeyi kabul etmeniz halinde, ankette yer alan bazı soruların benzerleri sorulacak ve daha çok kişisel deneyimlerden bahsederek yanıtlamanız istenecek.

Bu tip bir çalışmaya katılmanın size hiçbir olumsuz yansıması olmayacaktır. Sizden alınan bilgiler sadece bu akademik amaçlı çalışmada yer alacaktır. Ayrıca, katılım sağlayarak sizinle benzer durumda olanların temsil edilmesine katkı salayacak ve gelecekte daha iyi konut projelerinin oluşturulmasına dolaylı yoldan katkı sağlamış olacaksınız.

Katılımınız gizli tutulacak ve sadece size verilen numara ile çalışmada yer alacaksınız. Tamamlanan anketler, ve katılımınız halinde görüşme kayıtları, sadece bu araştırmaya yönelik genel sonuçlar çıkarmak için kullanılacaktır. Sonuçlar sadece bu doktora çalışmasına ait olup, araştırmacı sonuçlara göre genel bildirimde bulunmak amacıyla yetkili mercilerle irtibata geçebilir.

Bu araştırma sadece araştırmacının kendisi tarafından finanse edilmektedir. Herhangi bir kamu veya özel katılımcı mevcut değildir. Araştırma süreci ve sonuçlar sadece Queen's University Belfast'ta ilgili fakülte üyelerince incelenecektir. Araştırma ile ilgili daha fazla bilgi almak veya herhangi bir konuda danışmak için araştırma yürütücüsü ile irtibata geçebilirsiniz.

Bu bilgilendirme formunu okuduğunuz ve çalışma için zaman ayırdığınız için teşekkür ederim.

** Lütfen bu formu saklayınız. İleride sizinle benzer bir görüşme yapılmak istenildiğinde bu formu gösterebilirsiniz.*

**The Ethical Approval by the Research Ethics Committee of
the School of Planning, Architecture and Civil Engineering, QUB.**



**School of Planning Architecture and Civil
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Dr. Jason Von Meding
Lecturer in Construction Management
School of Planning, Architecture and Civil Engineering
Queen's University, Belfast
David Keir Building
Stranmillis Rd
BT9 5AG

20th May 2013

Dear Jason,

Application for Ethical Approval to SPACE SREC

Thank you for your application for ethical approval to the School Research Ethics Committee [SREC] for your doctoral research project: Transformation of the built environment in rural eastern Turkey: An investigation on state-built post-earthquake permanent housing projects [student: Didem Gunes Yilmaz].

The reviewers have examined your application and I am pleased to inform you that approval has been given subject to the submission of a satisfactory Risk Assessment and consideration of the points made below.

Thank you for the detail on the research instruments that you have developed for the fieldwork.

The Ethics Committee thought that you should consider the following:

1. Make sure that the language used in the information sheet and consent form is appropriate to a lay reader in the case study areas.
2. Also ensure that the respondent understand that they can withdraw from the interview process at any time.
3. The interviews may upset respondents, especially in recalling traumatic events. Please ensure that you can refer any individual who is upset by the research to the appropriate support in the area. You should work with your contacts in Turkey to establish such referral mechanisms, where appropriate. You should not pursue any interview that is upsetting to the respondent or where there is a potential to cause harm to the participant. You should consider these issues in the Risk Assessment.
4. Please ensure that all information gathered through the interviews will only be accessible to the researcher. Ensure the safe storage of data so that electronic versions of interview transcripts are held securely on a personal computer and have access restricted through password protection.
5. Hard copies of data should be stored in a locked filing cabinet and interview recordings (stored on a Dictaphone) need to be being carefully protected.

We would ask you and the student to complete a 'Risk Assessment' as part of this approval process, especially given the high level of seismic activity in the area.

This should set out the likely risks, mitigation and the practical steps to ensure the safety of the researcher, especially during fieldwork in Turkey. This should also consider the points made by the SREC on the need for sensitivity during all types of interviews proposed in the research.

I would be happy to discuss this with the student but the *pro-forma* below should help you to think through the analysis of risks in your particular project.

Thank you again for your application and best wishes with this interesting and important project.

If you have any other queries please do not hesitate to contact me.

Yours sincerely,



Dr. Brendan Murtagh

SPACE Research Ethics Committee

cc list:

Roslyn Barnes, Secretariat SPACE SREC, r.barnes@qub.ac.uk

Didem Gunes YILMAZ, dyilmaz01@qub.ac.uk

The villages visited in the pilot fieldwork

Erzurum

Alaybeyi

Beypinari

Ciftlik

Kahramanlar

Kayapa

Ocak

Cogender

Esendere

Ilicasu

Nenehatun

Orentas

Ovenler

Yaniktaş

Yigittasi

Akdag

Aksu

Karagobek

Orcuk



The satellite view of *Beypinari* village, visited on 12th July 2012.



A view from a traditional house, the left hand side is residence and the right hand side is storage. On the roof, hay is stocked.



A view from a similar type of traditional house, but abandoned.



The satellite view of *Kayapa* village, visited on 12th July 2012.



A traditional stone masonry building abandoned and half collapsed.



A view from a two-storey house, ground floor is stone masonry and the upper floor built on with poor RC ring beams with clay brick masonry walls.



The satellite view of *Cogender* village, visited on 13th July 2012.



A view from a three-storey RC frame building.



A view from a traditional masonry building occupied as a house.



The satellite view of *Akdag* village, visited on 14th July 2012.



A traditional stone masonry unit including house, barn and storage.



A view from a two-storey house built as extension from the stone masonry building in the ground floor.



The satellite view of *Aksu* village, visited on 14th July 2012.



A multi-storey RC frame building under construction.



A storage built with local materials nearby the multi-storey building.

The villages visited in the pilot fieldwork

Ardahan

Degirmenlidere

Cakirozum

Dedekilic

Dedesen

Dereyolu

Koprulu

Samandoken

Serincayir

Suruguden

Arpasen

Cayirbasi

Cobankoy

Karliyazi

Mollahasn

Tahtakiran

Tellioglu

Yagmuroglu

Yanatli

Balcesme

Dolecayir

Eskidemirekapi

Yenidemirkapi

Senemoglu

Okcular



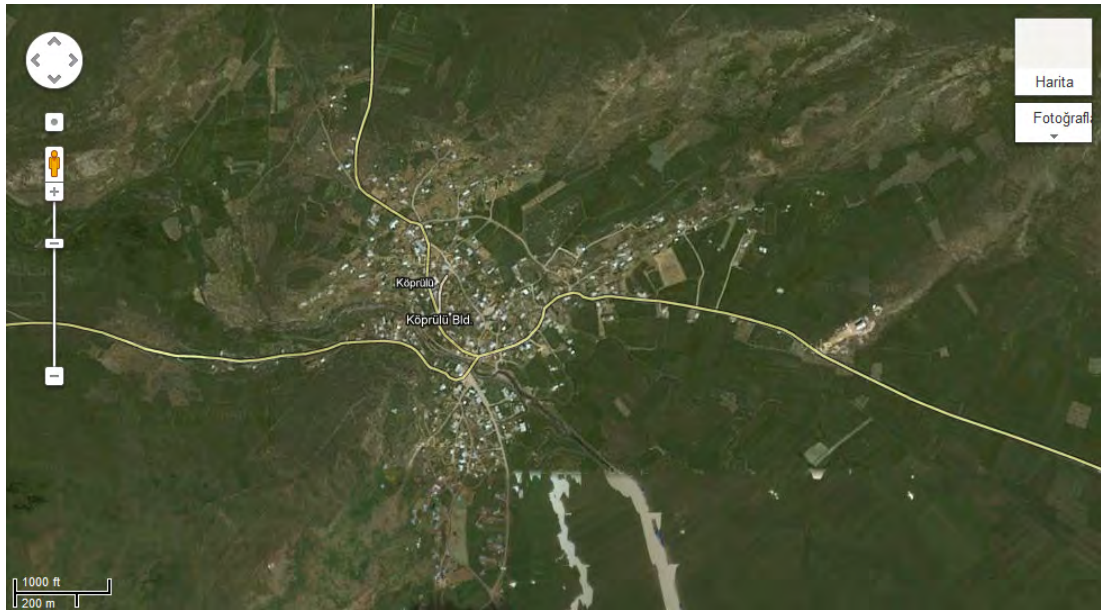
The satellite view of *Degirmenlidere* village, visited on 14th July 2012.



A view from a traditionally built stone masonry house, seasonally occupied.



A view from another seasonally occupied stone masonry house.



The satellite view of *Koprulu* village, visited on 15th July 2012.



A view from a seasonally occupied stone masonry house with RC frame.



An overall view from the settlement, a traditional timber log-stone masonry storage in the front and newly built RC frame buildings at the back.



The satellite view of *Cayirbasi* village, visited on 16th July 2012.



A view from a prefabricated house with an extension built with concrete blocks.



A view from a two-storey house built as RC frame structure.



The satellite view of *Karliyazi* village, visited on 16th July 2012.



A view of a prefabricated house, but unoccupied.



A view from a newly built two-storey stone masonry house strengthened with RC ring beams and cement mortar, and a traditional stone masonry house at the back.



The satellite view of *Yanatli* village, visited on 16th July 2012.



A view from a multi-storey RC frame apartment building.



A maintained stone masonry house (with cement mortar) and its adjacent units.

The villages visited in the pilot fieldwork

Kars

Mezra

Arazoglu

Esenkent

Esmeyazi

Halefoglu

Ocakli

Soylu

Subatan



The satellite view of *Arazoglu* village, visited on 18th July 2012.



A view from a well-maintained stone masonry house, occupied.



Ruins of a masonry structure built with shaped stone with no mortar.



The satellite view of *Esenkent* village, visited on 18th July 2012.



A general view from the village; a barn in the opposite of the house.



A view from a two-storey house, the ground floor is cut-stone masonry and the upper is RC frame with concrete block infill walls.



The satellite view of *Esmeyazi* village, visited on 18th July 2012.



A view from a storage built with cut stone as masonry.



A view from a two-storey building, the ground floor is storage and the upper is residence.



The satellite view of *Ocaklı* village, visited on 18th July 2012.



A view from a traditional masonry house built with cut stone.



A view from a house plastered and extended with concrete.



The satellite view of *Subatan* village, visited on 18th July 2012.



A traditional stone masonry house with its adjacent storage unit, occupied.



A view of another traditional stone masonry house and its nearby storage.

Erzincan*The background***Demographic characteristics**

According to a national development survey¹, Erzincan is 45th among 81 provinces in Turkey (UNDP-TR, 2012), though it is one of the most developed provinces in the Eastern Anatolia (SPO, 2000a; 2000b). Erzincan is one of the least populated provinces in the country with a population less than 200,000, and Table 1 shows that the province does not have an increase in the population for the last five years; the proportion of the population live in the urban areas increases, unlike the rural areas (TUIK, 2013). This implies that in addition to the normal population growth in this period there was also an influx of migration from the rural to the urban area within Erzincan.

Table 1 The change of the Erzincan population in the last five years (TUIK, 2013).

	Total population		Urban areas		Rural areas	
2007	213,538	+6,458	114,437	+11,683	99,101	-5,225
2013	219,996	+% 0.03	126,120	+% 10	93,876	-% 0.05

Livelihood of the population in the region is largely dependent upon the agricultural activities, primarily animal husbandry, cultivation and apiculture. In Erzincan, the agricultural activities affect 35.9% of the gross economic output, while the particular share of animal husbandry is 29.7% in this, as to the data from 1991. Differently from the other provinces in the region, Erzincan is one of the few provinces with relatively convenient climate for fruit and vegetable cultivation, and takes the advantage of being supplier to the markets. Therefore, the average income per capita of Erzincan is 67.7% of the national average of Turkey (SPO, 2000). Meanwhile, it is necessary to remind that the latest estimated average income per capita at national level is \$13,466 in Turkey (UNDP-TR, 2012).

According to the 2013 national statistics of TUIK, the literacy rate for 15-year old and above is 70% of the total population in Erzincan. The data indicates the population of illiterate people is 13,050, for the same age limit, and 8,909 (62%) of the illiterates reside in rural areas of Erzincan. Women are highly disadvantaged in this regard as the illiteracy rate is five times of the number of illiterate men in the province, while the rate is 4.55 in the rural areas. Distribution of the education levels (primary school, high school and university) among the rural and urban population is given in Table 2, which indicates large difference between the populations as well as the genders.

Table 2 The education levels of the population in the rural and urban Erzincan (TUIK, 2013).

	Primary school		High school		University	
	Women	Men	Women	Men	Women	Men
Urban	11,563	5,959	12,793	17,144	6,399	10,047
Rural	12,283	11,602	3,349	7,294	1,313	2,792

¹ The Socio-Economic Development Ranking Survey of Provinces and Regions is published by the Ministry of Development of Turkey in 2011. The survey includes 61 variables in 8 categories, which are demographics, education, health, employment, competitive and innovative capacity, financial capacity, accessibility and quality of life (UNDP-TR, 2012).

The table proves the disadvantages of women in education since the number of women sharply decreases after the level of primary school. The reason why the number of primary school graduated women is higher than the men lies under the cultural characteristic of the region, which gives priority to men to be more educated, so they can find job and finance the household. Women, however, keep the housework, so girls widely cannot continue their education as they are dropped out from school to help the housework. What more significantly the table indicates is that the population in the rural areas is largely composed of people graduated from primary school, whereas the university graduated has the lowest proportion. The reason why the distribution is so unequal is that, understandably, the urban area offers jobs, which require skills and a certain level of education, e.g. state officer or security staff. This attracts the educated people in rural, thus they migrate to the urban area. This case is not peculiar to Erzincan, as it is also discussed for Erzurum and Van as they show similarity.

Geographic characteristics

The whole area of Erzincan is 11,903 km² and the area of the city centre is 1622 km², which is approximately equal to 13.6% of the province. This is because of the mountains surrounding the province and covering 60% of its area. Only 20% of the province is formed by the plateaus. Particularly, the mountain Mercan on the south as high as 3462 m, the mountain Keşiş on the north as high as 3549 m, and the mountain Köhnem on the west as high as 3045 m physically limit the urban area to expand towards these directions. The mountains closing each other on the east of the urban area also narrow the area available to urbanise. Therefore, the city centre is located in such a small area and at the altitude of 1185 m, which is called the Erzincan basin. The soil character of the basin is largely composed of alluvial layers as deep as 300 m. This is due to the river Euphrates (Firat) passing throughout the province (Meguro and Nakano, 1993; Hayli, 1995; Hayli, 2001; Toy and Yilmaz, 2010). All are illustrated in Figure 1.

Despite being such mountainous area, the terrestrial climate conditions mildly affect the province, whereas it is quite harsh for the rest of the provinces in the region. According to the meteorological data from 1975 to 2007, the average annual temperature is 10.8⁰C as January is the coldest and July is the warmest time period in a year. However, like the other provinces in the region, Erzincan has frosty winter that can be cold as -25⁰C, and the situation of being 'under snow' lasts at least more than 43 days in a year (Toy and Yilmaz, 2010).

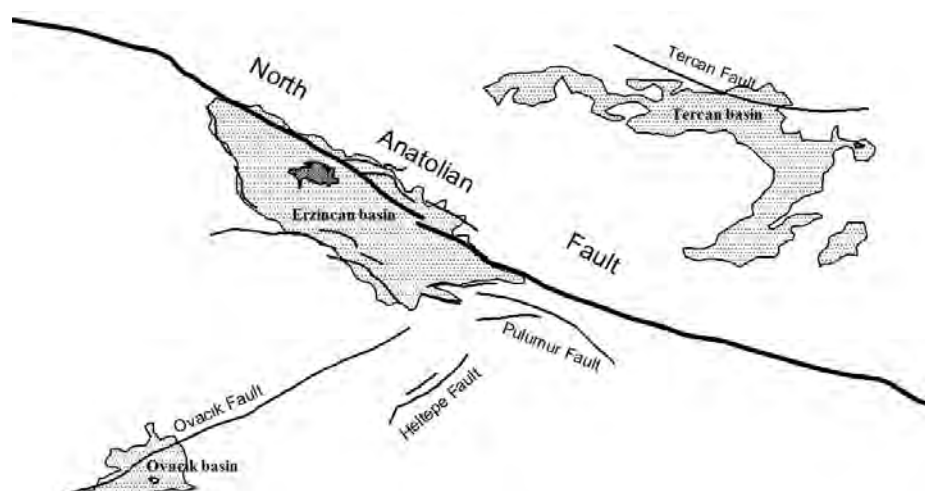


Figure 1 The surrounding faults affecting Erzincan (The map shows nearly an area of 130x70 km² and drawn from the Turkey Active Fault Maps of the General Directorate of Mineral Research and Exploration of Turkey).

There are 529 villages in Erzincan. Mountains surrounding the province have naturally affected the distribution of the rural settlements, which are mostly situated around the basin and at the skirts of the mountains. Along the Erzincan-Erzurum highway passes between the mountains on the east, there are numerous villages accessible from the highway. Unlike any other province in the region, the city centre of Erzincan has a designed settlement layout with large streets crisscrossing and forming grids for buildings. It is a medium-size settlement with low population density. This is the result of learning lessons from the past earthquake disasters, which heavily damaged both the rural and urban built environment in 1939 and 1992.

Seismic activity

Erzincan is one of the provinces in Turkey that has been stricken by two devastating earthquakes in the 20th century, like Erzurum and Van. The high seismicity it has is the consequence of its geological position, which is the junction of two secondary faults, the Ovacik Fault and the Northeast Anatolian Fault (Fig. 1), which create right-lateral strike-slip motion, with the highly active main fault, the North Anatolian Fault, which is 1600 km long and creates right-lateral strike-slip motion (Akinci et al., 2001; Erdik et al., 2003; Gürbüz, 2010). Besides, as Erzincan is situated on a considerably large basin with a dimension of 50 by 15 km, it is also under effect of the Pulumur Fault, which is 20 km to the southeast of the basin (Hasgür & Aydan, 1996; Aktar et al., 2004). This character of Erzincan basin is similar to the district of Karlıova, in Bingöl, which is also situated on the junction of the East Anatolian Fault and the North Anatolian Fault, at an approximate distance of 130 km from Erzincan. Therefore, its complex tectonic activity has long been the interest of numerous researchers, who commonly studied the formation of the basin and highlight the presence of seismic energy continue to change the structure of the basin (Alptekin & Oncel, 1992; Erdik et al., 1994; Pinar et al., 1994; Nalbant et al., 1996; Fuenzalida et al., 1997; Grosser et al., 1998; Eyidogan and Akinci, 1999; Akinci et al., 2001; Aktar et al., 2004; Gökalp, 2007; Avşar et al., 2013; Gürsoy et al., 2013).

What makes Erzincan significant in the history of Turkey is that the earthquake struck on 27th December 1939 with magnitude of 8.0 (M_s), which is acknowledged one of the most severe earthquakes in the 20th century. The earthquake was so disastrous that ruptured about 400 km throughout the North Anatolian Fault and felt strongly in the provinces located through the fault (Amasya, Tokat, Sivas, Ankara, Çankırı, etc.).



Figure 2 The prefabricated timber houses built after the earthquake (Koyunoglu, 1977).

The earthquake devastated over 100.000 buildings, and left nearly 140.000 people homeless, and caused deaths over 30000 that not only because of the collapses of the buildings, but also the coldness of the weather around -30°C that increased the number of deaths (Williams et al., 1992; Saatcioglu & Bruneau, 1993; Fuenzalida et al., 1997; Grosser et al., 1998; Anon., 2008; Uzen, 2010; Gul, 2011; Gürsoy et al., 2013). Given the limited available media at the time of the earthquake, only a very little number of resources were found that provided visuals from the 1939 disaster. The earthquake destroyed Erzincan, and the liquefaction was pointed out as the main reason that increased the extent of the damage (Hasgür & Aydan, 1996). The groundwater level of the basin varies from 16 m at the eastern to 30 m at the northern side of the basin (Sengezer, 2000), which makes it easily liquefiable during ground motions. Hence, in attempt to avoid this risk, Erzincan was relocated towards the northern basin, where the current location is (Williams et al., 1992; Meguro & Nakano, 1993; Hasgür & Aydan, 1996).

For the reconstruction of the settlements, authorities adopted some principles to prevent Erzincan from future disasters. For example, it was planned to rebuild the new city in an area of 300 hectares to reduce the density of population (anticipated 15.000 maximum in the next ten years) as well as the buildings.

Governmental and commercial buildings were limited to three-storey height and the residential buildings were limited to two-storey. The density was allowed to reach at maximum 100 people/ha for the city centre, and 50 people/ha for all of the other types of settlements. Roads were strictly defined as narrow streets were no longer allowed. The width of a main road was planned as 22 m, whereas it was between 12 and 17 m for secondary roads (Gülkan & Ergünay, 1995). Due to the collapses of heavy masonry structures, the authorities aimed to build light and earthquake-resistant structures in the residential areas. By that, an Austrian company was contracted to build 500 houses from prefabricated light-wood panels (Fig. 2), manufactured in Austria and Italy and imported ready to assemble on-site (Koyunoğlu, 1977; Baradan, 2008).

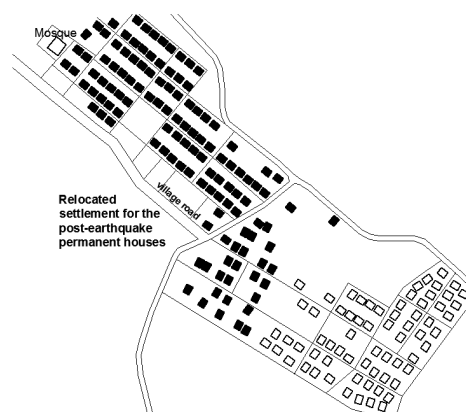
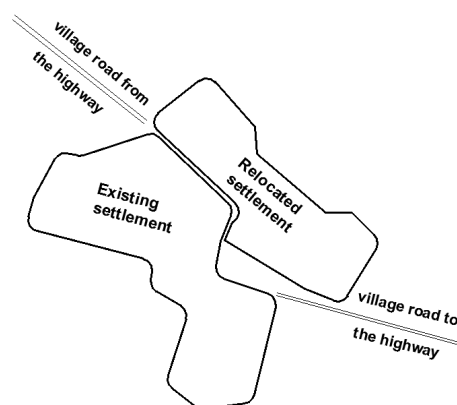


Figure 3 from top-down: the satellite view of Altınbaşak; the abstract map shows the existing and relocated settlements of Altınbaşak; and, the abstract map shows the locations of the post-earthquake permanent houses built.

The devastating consequences of the earthquake in 1939 made the authorities realise the lack of disaster preparedness and building codes, which turned out a milestone in the history of Turkey in terms of taking the first legal action to natural disasters (Sezen et al., 2000; Soyuluk & Harmankaya, 2012). A corresponding committee was gathered under the authorisation of the ministry and established the first seismic hazard map of Turkey as well as the first seismic design code², which was similar to the Italian seismic code and enacted in the following year of the 1939 disaster (Sezen et al., 2000). Since then, the seismic design code in Turkey had been kept revised following disastrous earthquakes. The latest version is updated in 2007 (Soyuluk & Harmankaya, 2012).

The sampled villages

Altınbaşak

Altınbaşak is situated 25 km southeast of the Erzincan city centre. It was administratively a village until 1990, when it was united with two adjacent villages (Suleymanlı and Büyük Kadağan). Hence, it gained the status of district municipality as it had a population more than 2,000 (Anon, Altınbaşak, Uzumlu, n.d.). According to the 2011 TUIK national census, Altınbaşak has 2,043 inhabitants and nearly 400 dwellings. The 1992 earthquake severely affected the settlement. It caused the deaths of 21 residents in Altınbaşak, and five in Büyük Kadağan (Gülkan & Ergünay, 1995). In addition, more than 500 residents were rescued from the rubble in Altınbaşak (Williams et al., 1992).

The strong ground motion caused visible liquefaction in some parts of the village since the settlement was near a river (Saatcioglu & Bruneau, 1993; Hasgür & Aydan, 1996). At the time of the earthquake, most



Figure 4 from the top-down: a view of an extended terrace of the house of the interviewee; a view of a largely extended entrance; a view from a rather simple roof extension in the entrance, and, a view of another house and its entrance extension.

² There are two codes used in Turkey regarding earthquakes and construction practice. The one is the 'Specification for Structures To Be Built in Disaster Areas', which is deemed 'seismic code', and the other is the 'Building Code Requirements for Reinforced Concrete', which is deemed 'building code' since reinforced concrete structures are the most widely applied types in Turkey (Sezen et al., 2000).

buildings in the village were either adobe masonry or timber frame with infill walls. Generally, the heavy flat roofs, which were composed of compact earth-infill supported by heavy timber logs placed unstably on the masonry walls, were the main reason for severe damage (Williams et al., 1992). After the earthquake, the village was reconstructed at a nearby site. A total of 122 permanent houses were built on the new site according to the planned layout, and nearly 80 were rebuilt in the existing settlement. Today, both settlements are inhabited, and are located 1 km from the highway (Fig. 3). However, the relocation site was found to be inconvenient since it sits on fertile land and the livelihood of the villagers is based more on farming rather than animal husbandry (Hayli, 1995).

The village was visited on 2nd September 2013 and fieldwork was conducted only at the relocation site. A total of 23 questionnaires were completed and one interview was recorded. During the fieldwork, it was found that a few houses in the village were not only reconstructed by foreign organisations, but also granted to the dwellers with no repayment. The owners of two of these houses participated in the survey, and one permitted the researcher to enter their house as well as conduct a recorded interview. The rest of the villagers were subjected to the regular house loan scheme of the state. Therefore, as 20 years have passed since the delivery of the houses, it is expected the owners have repaid the loans.

However, excluding the two discussed above, only 11 out of 21 residents stated that they had completed loan payments and received the ownership certificate for their properties. The amount they mentioned varied from 55,000TL to 190,000TL. The remaining 10 residents stated that they had not made any payments because of their poor financial status. Accordingly, as a part of the questionnaire, it was found that 16 out of 23 had regular income such as a pension, while the rest were dependent on income from agriculture.

With regard to the physical condition of the houses, the majority of residents stated they had refurbished the interior of their houses. For example, many

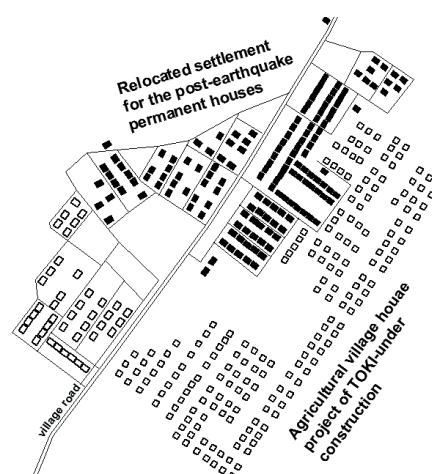


Figure 5 from top-down: the satellite view of Bayirbag before the implementations of agricultural village house projects of TOKI; the satellite view of the settlement; and the abstract map shows the locations of the post-earthquake permanent houses built.

changed floor coverings and interior doors or repainted the interior and exterior walls. Many also replaced the wooden window frames with PVC frames. In addition, some dwellers had added simple porches to the entrances of the houses in order to create an outdoor space for sitting, as in the examples given in Figure 4.

It should be noted that an area of 109 hectares including over 360 buildings in the settlements of Altınbaşak, Suleymanlı, and Büyük Kadağan were officially declared a 'high-risk zone' on 26th April 2013 (Resmi Gazete, 2013). This means that further redevelopment and reconstruction plans will be implemented in Altınbaşak to renew the built environment.

Bayırbağ

Bayırbağ is situated across from the settlement of Altınbaşak on the other side of the highway at a distance of 20 km from Erzincan city centre. Bayırbağ was highly populated between 1990 and 2000, with almost 5,000 inhabitants. Thus, like Altınbaşak and Yalnızbağ, it was given the status of district municipality. However, according to the 2011 TUIK national census, it has 1,083 inhabitants, which indicates the village it has a decreasing population as in Yalnızbağ.

The village was completely rebuilt after the 1992 earthquake and relocated to the lower skirt of the mountain in which it is currently situated, nearly 1,650 m from the former settlement. Today, it is 1.5 km from the highway. The relocated settlement has a simple layout, in which 195 buildings sit along both sides of the village road (Fig. 5). Most houses were rebuilt through the agency-driven approach, with only few built through the owner-driven approach.

The village was visited on 4th September 2013 and 17 householders were surveyed. The questionnaires revealed that nine out of 17 residents had repaid their construction loan and held the certificate of ownership for their house.



Figure 6 from top-down: a view from a house with an added storage building nearby; a view from a house with added rooms on the right side of the house; a view of the playground placed in the village; and a view from the agricultural village project of TOKI.

Two residents stated they were still making payments, with one almost finished and the other halfway through repayment. Nine participants stated they had regular income; none of the participants stated they were engaged in animal husbandry. Only a few mentioned that they relied on farming to provide their basic needs. Among 17 participants, none had added extra space to their house, but had done alterations similar to those completed in other sample villages such as painting walls, adding a porch to the entrance, changing floors to wood laminate flooring, and adding insulation under the roof. However, many also mentioned that they would do more alterations if they could afford them, which was also the case in the other sample villages. In addition, even in the 1990s, only one-third were dependent on animal husbandry according to a study by Hayli (1995). Hence, most residents either did not receive a barn along with their house or, if they did receive one, they transformed it into storage or even an extra residential unit, particularly for their elderly parents (Fig. 6).

In Bayırbağ, the construction of houses within the framework of the Agricultural Village Project of TOKI is on-going as part of the state's regeneration plan for rural areas. This project was developed by authorities to prevent the depopulation of rural areas by building attractive settlements for the villagers (TOKI, 2011). Through the realisation of this project, the settlement may regain its population in the future.

Kurutilek

As a result of the expansion of the urban area, Kurutilek became the closest village to the Erzincan city centre at a distance of 3 km. It is a medium size settlement with 547 inhabitants according to the 2011 TUIK national census; and includes about 135 dwellings, which were rebuilt after the 1992 earthquake. The location of the village was not changed for reconstruction and most houses were rebuilt in their original location (Fig. 7). However, in contrast to the other sample villages, a number of

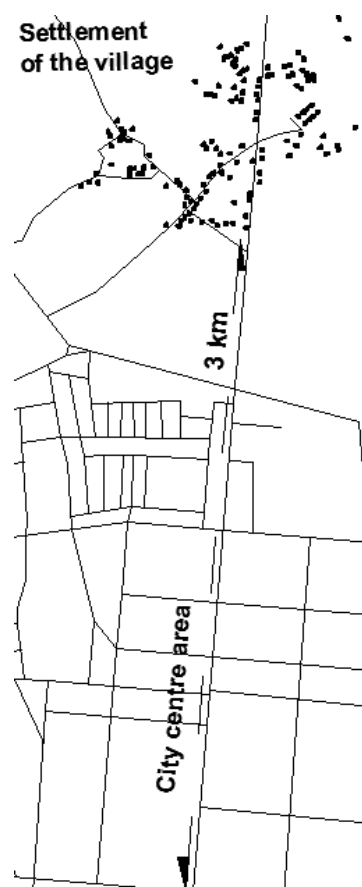


Figure 7 The satellite map of Kurutilek, and the abstract map shows the settlement layout and also indicates how close the village to the city centre.

houses were rebuilt through the owner-driven approach in addition to the houses rebuilt through the agency-driven approach.

The village was visited on 3rd September 2013; because the houses are widely dispersed, only seven participants living in houses built through the agency-driven approach completed surveys. It was found that five of the seven participants had completed the loan payments, and two were unable to answer the question and stated they did not know. Five respondents were dependent upon a regular salary or pension, with only one participant stating that agriculture was the livelihood. Many houses were occupied at the time of the fieldwork, and only one respondent was a seasonal occupant. Alterations to the houses were similar to those in other villages and included the addition of porches, changing window frames to PVC material, painting walls, and replacing terracotta roof tile with galvanised aluminium. One dweller had added a room to his house. However, all of the participants stated that no barns had been built for them, and those that needed one had built one on their own in the backyard (Fig. 8).

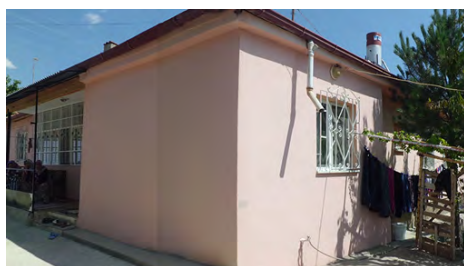


Figure 8 A house with an added room and a view of the barn belong to the same owner.

As a special note, the researcher's personal opinion based on field observations is that despite village's location very close to the central area, it seemed residents of the settlement did not take advantage of this opportunity. That is to say, the settlement has neither the image of a village as it spreads over a large area, nor the quality of a well-established peripheral settlement as it lacks a proper settlement layout.

Saztepe

Saztepe is a small village that has 206 inhabitants according to the 2011 TUIK national census, and currently has 48 dwellings. While no specific records were found about earthquake damage in Saztepe, it is located nearly 1 km from the fractures created by the earthquakes that took place during the 1900s on the North Anatolian Fault (Emre et al., 2012). Therefore, it is not wrong to assume that it might have been heavily damaged by the 1992 earthquake since during fieldwork; it was found that all of the houses were constructed after the earthquake. Saztepe is situated by the Erzurum-Erzincan highway at a distance of 10 km from the city centre and 5 km from Altınbaşak, which is the adjacent settlement on the same side of the highway. The village was reconstructed in its original location; some houses were built in exactly the same place of the former building, and some were built according to a planned settlement layout (Fig. 9).

The village was visited on 2nd September 2013, on the first day of the fieldwork in Erzincan. However, due to the small population of the village, only seven residents were located to complete the questionnaire. Additionally the area closer to the highway was explored by walking.

Most houses in the village had sheds added to their entrances, and their window frames were changed to PVC profiles. Four participants stated that they had repainted interior walls, while most of the houses in the village still had their original exterior wall paint, which was in somewhat poor condition. Most dwellers actively used their barns for animals; whereas some used the barns for storage.

Only two of seven respondents had completed payments and, as they clearly stated, the amount they had paid was 75,000TL for the residential unit, and 50,000TL for the barn. The others stated that they had made no payment thus far and one respondent stated that he lives in the city centre so had not thought about buying the house. Four respondents had regular income from a pension and three were dependent on farming and animal husbandry.

Yalnızbağ

Both the 1939 and 1992 earthquakes caused severe damage and casualties in the village. According to the unofficial society webpage of Yalnızbağ, 425 died in the 1939 earthquake (Yalnızbağ'ın tarihi, 2011) and 23 in the 1992 earthquake (Gülkan & Ergünay, 1995). The original settlement area of the village was at the higher skirt of the hill (~1354 m) to the northwest of Erzincan, approximately 10 km from the city centre. After the 1992 earthquake, the village was partially relocated 2 km away to the lower skirt (~1270 m); however, it started to expand towards the urban area of Erzincan. In addition, a number of permanent post-earthquake houses were built in the existing settlement and this

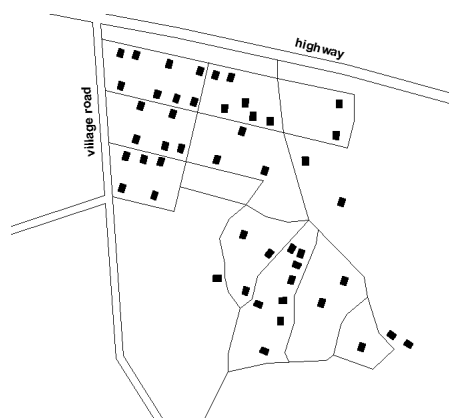


Figure 9 from top-down: the satellite view of Saztepe; the abstract map showing the locations of the post-earthquake houses built in the village; a view from a house with extended entrance; and, a view from a barn built in 1992 with a door and window closed by owner.

area was expanded along the road into the city centre. The expansion current reaches 4 km and, since it has no clear border, the settlement is almost united with surrounding settlements as well as the urban area (Fig. 10).

Yalnızbağ is one of the most populated settlements in Erzincan. Accordingly, for better administration purposes, it was united with the neighbouring village of Dereyurt and was given the status of district municipality in 1998 as it has nearly 2,000 inhabitants at that time. However, research revealed that Yalnızbağ has a decreasing population; according to a 1992 field report of the EEFIT, it had 2,734 inhabitants, but the 2011 TUIK national census indicated it has 1,870 inhabitants. According to the researcher's field observations, this can be explained by a number of dwellers who own houses in the village but occupy them only during the summer. At the time of fieldwork, there were a large number of houses unoccupied since the end of summer was approaching, particularly in the area of the existing settlement. Few unoccupied house were observed in the relocated part of Yalnızbağ.

Devastation caused by the earthquake was extensive in the village and 70% of the building stock was reported heavily damaged or collapsed. The structural types of the buildings in Yalnızbağ were considerably different from remote villages with more traditional housing such as Altınbaşak. According to the post-earthquake field report of the EEFIT, most of the residential units had RC frames and ranged varied one-storey to three-storey, while masonry buildings were made of half adobe bricks and half concrete blocks plastered with cement mortar and walls surrounded by RC ring beams. Only the animal shelters were clearly in poor condition (Williams et al., 1992). This can be explained by the proximity of the village to the urban area and the resulting easy access the construction market.

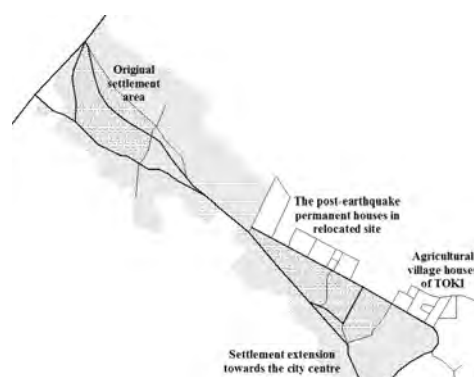


Figure 10 from top-down: the satellite map of Yalnızbağ with the expanded area; the abstract map shows the traces of the housing settlements; the satellite map of the relocation site; and, the abstract view showing the locations of post-earthquake permanent houses.

The settlement was visited on 3th September 2013, and 26 residents were surveyed. The fieldwork began in the original settlement area of the village, where the post-earthquake permanent houses were built in the same location as damaged houses. The area is large and the houses are located far from each other. Despite this, a long walk was made to the expanded area and 14 residents completed questionnaires. After this, fieldwork was continued in the relocated settlement, and was considerably easier to complete as the houses were closer to each other. Twelve householders from the area completed questionnaires.

All of the houses were well-maintained, including the alterations made by the dwellers. The most common alterations were repainting interior and exterior walls, changing floor coverings in the kitchen and kitchen cupboards, replacing terracotta roof tiles with galvanised aluminium plates, and adding insulation as it was not included during initial reconstruction. In addition, many dwellers had added one room to their houses and a porch at the entrance. However, some dwellers had also rebuilt a barn on their own as they had transformed the function of the former one. In one case, the house damaged in the 1992 earthquake remained standing in the yard just in front of the reconstructed house (Fig. 11). Of the 26 participants, only one stated that he was a shepherd and his livelihood was solely based on this activity. Nineteen stated they had regular income from a pensioner or worked as a state officer. Three were in the construction sector and worked particularly in the nearby urban area. Two were retailers in the city centre, and one was a bus driver. A few stated they had a small plot of land for farming with one or two cattle to provide their needs besides their regular income.

Despite the data indicating a better economic status of residents in this village compared to those in the other sample villages of the study, only 10 out of 26 residents had completely repaid the reconstruction loan, with one additional resident who stated he is still repaying the loan. The amount paid varies between 75,000TL and 350,000TL. The remaining 15 respondents stated they had never made payment on the loan; a few mentioned they would like to repay the loan, but they did not have sufficient savings to do so.



Figure 11 from top-down: a view of a damaged house since 1992; the house built in the opposite of the ruin; a barn built by a dweller.

Erzurum*The background***Demographic characteristic**

According to the 2011 Socio-Economic Development Ranking Survey of Provinces and Regions, Erzurum is 59th among 81 provinces in Turkey (UNDP-TR, 2012), despite being the most developed province after Erzincan in the region (SPO, 2000). It is the second most populated province of the region after Van. However, as the Table 1 indicates, it suffers migration like the other provinces in the region. The population decreases regularly since 2007. Particularly, the data of 2011 and 2012 indicate that the population growth in the urban areas is the result of the migration from the rural, but the increasing depopulation reflects the migration out of the province, which is quite sharper between 2012 and 2013 (TUIK, 2013).

Table 1 The change of the Erzurum population in the last six years (TUIK, 2013).

	Total population		Urban areas		Rural areas	
2007	784,941		485,563		299,378	
2011	780,847		505,254		275,593	
2012	778,195	-2,652	509,474	+4,220	268,721	-6,872
2013	766,729	-11,466	-		-	

The average income per capita of Erzurum is 44.0% of the national average of Turkey (SPO, 2000) and is equal to \$5,925 per year. Due to the dominating harsh climate, animal husbandry has the largest share in agricultural activities. The data from 1991 indicates that it is 54.1%, of total agricultural economic gross of Erzurum. Despite this, the labour demand and supply in agricultural sector are insufficient that pushes migration from rural to the urban. To say, labour demand for the rural Erzurum is 2.5, while it is 3.8 in Van. This is an inevitable result of low-income of the rural sector, which can reach only 34.3% of the income of a person in urban Erzurum; while, this is 49.3% for Erzincan, which is relatively better (SPO, 2000).

According to the 2012 national statistics of TUIK, the literacy rate for 15-year old and above is 62% for Erzurum population. The rate is higher in urban areas as it is 92.4% and 78% in rural areas. In contrast, the rate of the illiterates is 5% in urban areas (20,312 to 369,549), and 15% in rural areas (27,515 to 180,875). The ratio of illiterate women to men is critical as it is 4.2 times higher than men in rural areas, and 6.4 in urban areas. With regard to these inequalities, Table 2 provides the distribution of different education levels of rural and urban population, and women and men.

Table 2 The education levels of the population in the rural and urban Erzurum (TUIK, 2013).

	Primary school		High school		University	
	Women	Men	Women	Men	Women	Men
Urban	51,414	25,520	38,078	62,301	17,245	27,510
Rural	26,804	30,434	2,397	9,689	868	2,590

The table suggests that women in Erzurum are highly disadvantaged. The underpinning reasons of this difference are as explained in the case of Erzincan. However, the significant difference in the rural areas of Erzurum is also the result of higher conservativeness of people than that of Erzincan and Van, which limits the girls and women to a great extent. Since the education level of women is deemed as an indicator of development in general, the authorities in Turkey paid attention and applied different programmes to increase the enrolment rate of female students to primary schools, but do not monitor the further levels of their education. The results in the table clearly indicate that due to the lack of monitoring the continuity in education, rural families widely limit the education of girls and women after primary school. From another perspective, as the further levels of education, high school and university, are mostly available in urban areas, the city centre and districts, it causes depopulation of rural areas in the long run as both men and women prefer to stay and be employed in these areas.

Geographic characteristic

Erzurum is the largest province of the region, and the 4th in the country. It has an area of 25,066 km² and the city centre has 3,385 km², which is 13.5% of the province. 64% of the province is mountainous and 20% is plateau; and 30% of its northern land is situated in the eastern part of the Black Sea Region, where is the most mountainous area of the province, and characteristically affects the climate and flora. The rest 70% is geographically shows the characteristics of the Eastern Anatolian region. The city centre is located in the Erzurum basin, which is 825 km², at the altitude of 1,853 m. The nearest mountain is the Palandoken, which is as high as 3,176 m, and situated on the south of the city centre. The mountain Dumlu is on the north and reaches 3,169 m., the mountain Kargapazari is situated on the northeast of the city centre and reaches 3,045 m. the mountain separates the Erzurum basin and Pasinler basin, which is the second largest basin in the province, and has an area of 540 km². The soil character of the province differs due to the volcanic structure, but Erzurum basin is primarily composed of basalt, andesitic basalt and tuff in the depth of 1,500 m, and different alluvial and fluvial layers in the depth of 200-700 m from the surface (Yarbasi and Kalkan, 2009). As a result of the altitude, the terrestrial climate affects the province severely with its cold and frosty winter lasting longer than summer, which is hot and dry, and only lasts few months in a year. The coldest period of the year is between December and February, which reached -37 °C at its coldest time. Snow falls heavily and remains 150 days in average. July and August are the warmest period of year, reaches 27°C in maximum (Anonymous, 2012; Anonymous, 2014).

There are 968 villages in Erzurum, which makes it 4th among 81 provinces with regard to the number of villages. Villages are spread all over the province, and some are located on steep hills, and they give the feeling of isolation as they are away from each other and hardly accessible. Villages located in and around the basins are more populated than isolated ones. According to the 2013 TUIK national census, there are six villages with less than 10 habitants, while some are over a thousand.

Unlike Erzincan, the city centre of Erzurum does not have a clear settlement layout, though it experienced severe earthquakes as well; the one was in 1983. It shows a characteristic of an urban settlement that expands rapidly and irregularly due to population influx, which is surrounded by slums and squatter settlements. Particularly, the extension towards the south and southeast of the basin is increasing the hazard risk as the area is under risk of exposure and the soil character is inappropriate (Yarbasi and Kalkan, 2009).

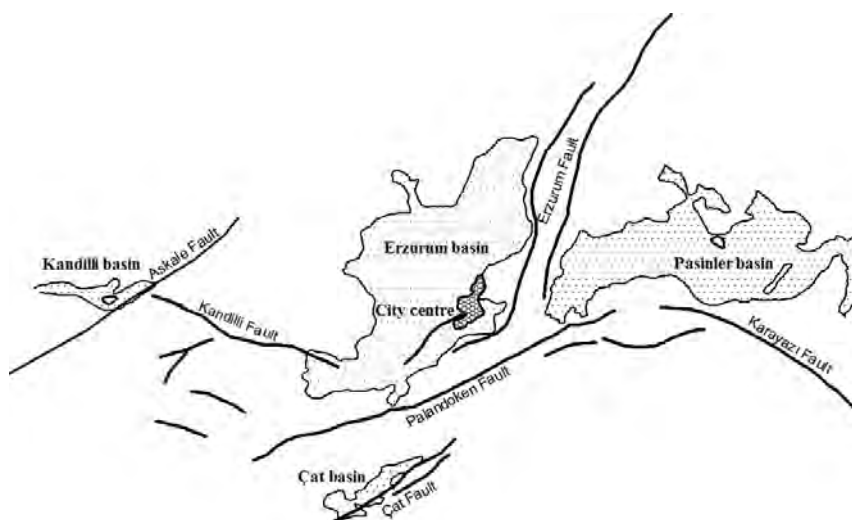


Figure 1 The surrounding faults affecting Erzurum (The map shows nearly an area of 110x70 km² and drawn from the Turkey Active Fault Maps of the General Directorate of Mineral Research and Exploration of Turkey).

Seismic activity

Erzurum is largely situated on the second degree seismic hazard zone, while a smaller part of its south is on the first degree. To say, it does not suffer the North Anatolian Fault, unlike Erzincan. Instead, through the middle and northwards of Erzurum, there are numerous small sized, with depth and length, active faults that frequently generate moderate earthquakes. This area is deemed as the active tectonic belt of the Eastern Anatolia Region (Yarbasi and Bayraktutan, 2001). There are several basins formed through the belt under the risk of particular faults. Kandilli basin, on the west Erzurum, extends between the districts of Askale (Erzurum) and Tercan (Erzincan), and it is seismically by Askale and Kandilli faults (Fig. 1). Erzurum basin is situated in the middle of the province, where also the city centre is located; and, it is bordered on the east by the Erzurum fault, which is the largest fault in the area with its 80 km length. It is a highly active left-lateral strike-slip fault (Dogan et al., 2004). On the south, the basin is bordered by the Palandoken fault, which lies along the Palandoken volcano-tectonic ridge. However, this area, where the Erzurum and Palandoken faults conjugate, is particularly anticipated to generate a severe earthquake in future since there are a number of small-size right-lateral and left-lateral

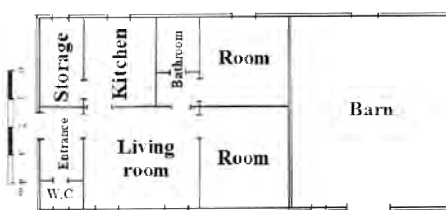


Figure 2 The relocation settlement of Gerek village, the house plan implemented and a view of a post-earthquake permanent house (Gok, 1995; Gok, 2001).

strike-slip faults (Yarbasi and Kalkan, 2009; Yarbasi et al., 2004). On 10 km south of the Palandoken fault, there is relatively small Çat basin and the Çat fault lies along the basin. On the east of Erzurum basin, there is Pasinler basin that extends towards Horasan basin on the very east of the province. The faults in Erzurum generated several significant earthquakes in the past century, which stroke the eastern part of the province, the Pasinler and Horasan basins, in 1924 ($M=6.8$), 1952 ($M=5.8$) and 1983 ($M=6.8$) (Yarbasi and Kalkan, 2009).

The 1983 earthquake with a magnitude of 6.9 M_s stroke on 30th October and caused heavy damage in the east and northeast of Erzurum. It particularly affected the villages as it destroyed around 3.000 buildings and left almost 18.000 people homeless only in Erzurum (Aysan, 1984). The village of Gerek was totally devastated with 92 houses collapsed and 158 villagers died (Gok, 1995). In total, 147 villages were seriously damaged, 1155 people died, 583 injured, and affected nearly a population of 92.000 in the area covering Erzurum and Kars, the neighbour province (Aysan, 1984).

Site selection and design of the houses were decided by the official teams. Site selection took two weeks, and several construction companies were hired to build villages. The houses planned in the first place were with storage and barn units in ground floor, and residential unit in the upper floor as a two-storey building. However, the houses were eventually built as single storey, in the front half was residence, and the back half was barn (Fig. 2). The size of house was disliked by most villagers due to its small area (Aysan, 1984; Gok, 1995; Gok, 2001).

Reconstruction in a relocated site was particular for the villages affected above the destruction ratio of 10% (i.e. 10 houses of 100 must be destroyed in one village). Local participation was at minimum as most of the decisions were made by the officials. Families were supported to repair or build their houses with an amount of \$3.750. This value was far lower than the cost of hiring a contractor, which was nearly worth \$8.000. Reconstruction in a relocated site was applied to 72 villages, of which 57 were to be rebuilt on the state lands. For the rest 15, the sites were required expropriation as they were private lands, and had a cost of \$325.000 in total to the state. Relocated villages were planned in an area of 400-500 m^2 and each with a linear settlement layout, 7 m width roads were designed to divide the villages in parts for the

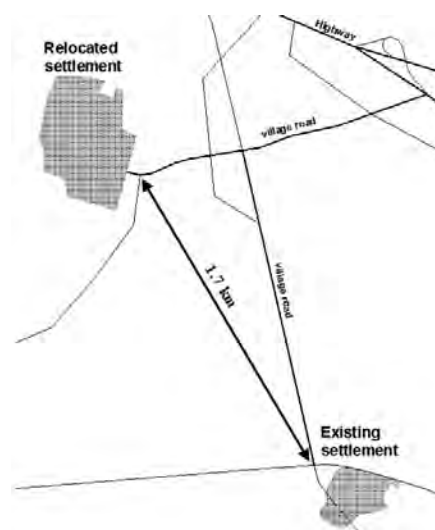


Figure 3 The satellite map of Cigdemli and the abstract map showing the relocation distance of the village.

easy transportation. Seven contractors were hired to complete the reconstruction of 3.000 houses in relocated sites (Aysan, 1984). The structural type of houses was RC frame with clay brick walls on concrete foundations and iron truss roof covered with wood panels. The sizes of the windows were 40x40 cm for toilets and bathroom, 60x90 cm for rooms and kitchen. It was found insufficient by dwellers in terms of providing natural lighting for the inside. Clay brick masonry walls were constructed as double walls to provide heat insulation; but the lack of insulation layer between the walls caused the plaster fall due to the temperature difference (Gok, 1995; Gok, 2001).

It was reported that since the use of concrete was not a non-local technique, a number of houses were observed with structural faults as the self-builders had no construction experience with the material. Despite this, most of the reconstruction process was reported finished within one year following the disaster (Aysan, 1985), and by the year of 1998, a newspaper reported 15 families still waiting for the completion of their houses (Anonymous, 1998). Another newspaper reported 66 families received their houses just in 2004 (Anonymous, 2004).

The sampled villages

Çiğdemli

The village is situated 22 km from the city centre, and, according to the 2011 TUIK national census, it has 555 inhabitants. The 2004 earthquake severely damaged the village and hence it was entirely rebuilt by the state. However, the village was divided into two parts since some families did not want to leave their former location to replace their damaged houses, while others were relocated to the new site. In total, 36 residential units were rebuilt in the existing location, and 33 were built in the new location. Both settlements are quite dispersed in terms of their layouts. The new settlement is 2600 m away from the existing location via the village road (Fig. 3).

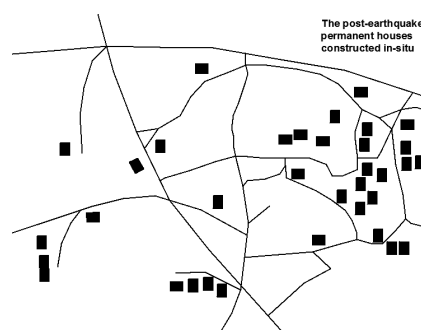
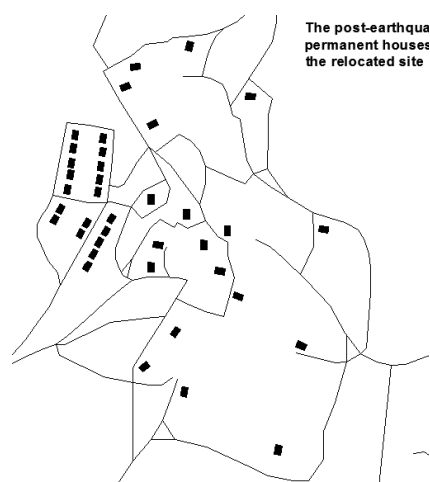


Figure 4 from the top-down: the satellite map of the relocation site of Çiğdemli and the abstract map showing the houses built; the satellite map of the former settlement and the abstract map showing the post-earthquake houses built.

In the existing settlement, the footprints of the foundations of collapsed buildings are still visible as well as the ruins of some of the buildings; although it has been a decade, they have not been completely removed (Fig. 4). The existing settlement consists mainly of single-storey houses, and similar alterations have been made by the residents as in other villages such as sheds at the entrances (Fig. 5).

The relocated settlement is at a higher altitude than the previous settlement and mostly consists of two-storey buildings with a barn on the ground floor. However, since few families have animals, barns are often used for different functions. For example, some use them for storage, while others have altered their barns as an extra residential unit on the ground floor. Although some families have animals, because they have found it inappropriate to have a barn directly under their residence due to noise, damp, and bad odours, they have built a separate barn. In addition, since residents found having open exterior stairs as an entrance inappropriate for the cold climate of the province, they have made alterations in many different ways and some have used the under-stair area as extra storage (Fig. 5).

The village was visited on 30th August 2013, and 20 questionnaires were completed at the relocated site of the village. Questionnaires revealed that none of the residents had repaid the loan. Only three of 20 had lived in their house less than five years; the rest had lived in their house since they initially received it. Regarding the experience during the earthquake, only two of 20 respondents experienced the earthquake in 1983, while 18 experienced the 2004 earthquake. Only seven of 20 indicated they are dependent on agricultural activities, mainly animal husbandry, as their only source of income. Four participants were pensioners, and one elderly participant stated she has no source of income and is dependent on assistance. The remaining eight have various occupations, including driver, construction worker, and security staff in a state building. One clearly stated he gave up animal husbandry after the 2004 earthquake. The families who have livestock mostly use their barns in the former village location, and use their new barns for storage or as a hayloft. Two participants built separate barns on their own as they found the new barns inappropriate. The remaining participants use their ground-



Figure 5 from the top-down: an example of a shed added to the entrance of a single storey house in the former settlement of Cigdemli; the general view of two-storey buildings built in the new settlement; a two-storey building with an added room next to the house; and the extension of the entrance of a two-storey house.

floor barn for storage, e.g., for kitchen equipment and food or for stocking coal sacks) as they do not have livestock. One transformed the ground floor into a residential unit. Regarding the alterations, four participants stated that they had joined two rooms to create one large room. One participant had added a room to his single-storey house. All participants had altered the entrances to their houses by simply covering them with metal plates or constructing extra space with concrete (Fig. 6.21). Another type of alteration widely observed was covering the under-stairs area to use this space for extra storage. All the participants had painted the interior of their house and a few had painted the exterior as well. Renewing the interior doors was also another common alteration. One respondent stated they had problems with the drain pipes had to change them.

Paşayurdu

The village is situated 24 km from the city centre and according to the 2011 TUIK national census, has 321 inhabitants. The village was heavily damaged by the earthquake, so it was completely relocated and reconstructed. By the village road, the former location is almost 2 km from the highway. Due to the preference of the villagers, the relocation site was planned 100 m away from the highway (Fig. 6). However, a few mentioned that the road caused noise and that it was colder because of the severe winds that blew in from the highway.

In the former settlement, no residential units were reconstructed, unlike Çiğdemli. Nevertheless, a few families were still using their barns in the former settlement since only half of the villagers (25) were delivered barn units in the relocated site (Gok, 2007). Even so, most families found their new barn small, and continued to use the former barn as well.

Fifty houses were built in the relocated site with a clear layout. Nearly half were two-storey, and half were single-storey. The relocation site was found to be inappropriate by previous researchers as it is fertile land. Furthermore, regarding the infrastructure of the relocation site, all of the clean water, sewage, telephone and electricity lines pass through the same infrastructure bed, which was also deemed inappropriate (Gok, 2007; Gok et al., 2011).

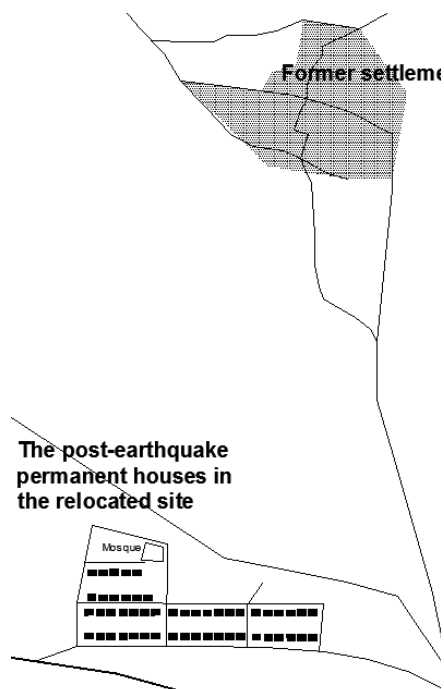


Figure 6 from the top-down: the satellite map shows the former and new settlements of Paşayurdu; and the abstract map shows the relocation site and the settlement of the village.

The village was visited on 1st September 2013, but due to the number of unoccupied houses and the absence of some residents at the time of the fieldwork, only nine participants who were able to complete the questionnaires were located. With regard to their post-earthquake temporary shelter experience, three participants stated that they had left the provided tents and lived in their damaged houses until the reconstruction of their house was complete. These residents stated they had made minimal repairs to their damaged houses in order to stay, or, as one said, they has used a room that was in better condition than the rest of the house.

None of the participants had repaid the loan, and four stated they thought the houses received were not worth the amount of the loan since they are located in a village with poor conditions. One said the lack of repayment was due to his low income as he also receives free coal from the state during the winter. One also complained about the poor quality of the construction. In this regard, it should be noted that most buildings had either small or large cracks on the exterior walls. The poor quality of the structural material used was observed in an unoccupied house where the plaster had fallen off the exterior stairs and the stone covering on the steps had cracked and was removed due to its low quality and poor workmanship (Fig. 7).

The most common alterations observed were porches added to entrances and painting the walls. Two participants transformed their ground-floor barn into a residence since they did not need a barn. One was building a separate barn at the time of the fieldwork. One participant had replaces the stone covering of the stairs because it had fallen off.

Regarding the economic conditions of the villagers, only one of nine indicated he is dependent on animal husbandry, while three stated that they had sold their livestock after the earthquake and currently worked in construction workers as they had previous experience and it provided a better income. Three respondents are pensioners, one works as a driver, and one works as a state officer.



Figure 7 from the top-down: a porch built with different materials added to the entrance of a two-story house; an extension built under the cantilever and the entrance; view of exterior stairs of an unoccupied building; and cracks on an exterior wall by the entrance.

Tebrizcik

The village is situated 25 km from the city centre and, according to the 2011 TUIK national census, it has 432 inhabitants. The access road is available only via the village road of Çiğdemli, and is 2.7 km from this settlement. Access by road from the highway is 5.8 km. The 2004 earthquake caused serious damage in the village, and 37 houses were recorded as heavily damaged or collapsed (Göksoy et al., 2004). Therefore, the village was completely relocated at a new site 1.7 km from the former site situated by the village road. The former settlement is totally abandoned today, with no residential or barn units in use (Fig. 8).

Fifty houses were built at the relocation site and the layout was mainly shaped according to the village roads. However, like Paşayurdu, some residents pointed out that the new location is very windy and mentioned the mildness of the former location as it was at a lower altitude. Most houses were permanently inhabited, with only a few that were seasonally occupied as a summer vacation house.

The village was visited on 30th August 2013, and 20 questionnaires were completed, meaning almost half the dwellings were investigated for the study. None of the respondents experienced the 1983 earthquake, but all experienced the 2004 earthquake.

None of the participants had repaid their loan. Half of the participants stated livestock was their only source of income. Five of 20 were pensioners, and the remaining five had varied sources of income, including three who work as state officers, one who works in construction, and one who works as driver. The participants who worked as state officers occupied their houses seasonally as vacation homes. Ten of the 20 indicated they actively use their barns, and some also built extensions to their barns or an additional separate barn, in the case of the one participant who owns more than 20 head of cattle. Two respondents stated that they were not delivered a barn and thereby

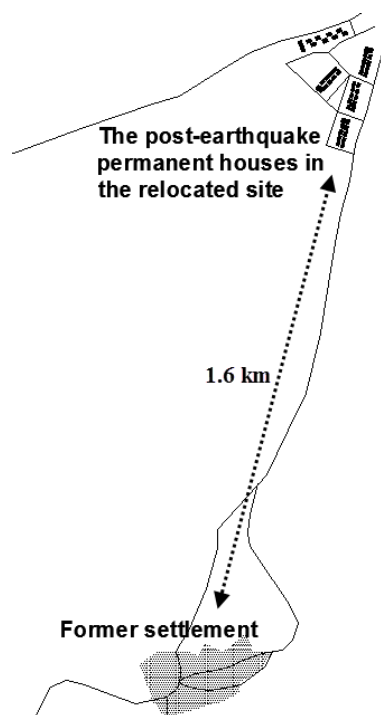


Figure 8 The satellite map shows both the former and the relocation site of Tebrizcik and the abstract map shows the relocation distance of the village.

they had only a house. Two participants used their barns for storage since they do not have livestock, and three transformed their barn into a residential unit for their elderly parents who were not able to use the stairs (Fig. 9).

Adding a porch as an extended entrance to the main door was the most common alteration. Painting the interior walls and renewing the interior doors were the second most common alterations. Two participants had also replaced the floor covering in the rooms with wood laminate. One participant had applied extra insulation to the roof as they had the difficulty heating the inside of the house. Similarly, two respondents stated that they would like to apply additional insulation underneath the roof if they could afford to do so. Five of 20 joined two rooms to create one large room, as seen in the previous cases. Furthermore, two participants who resided in single-storey houses stated that they would consider adding an extra floor to the building in the future.

Tazegül

The village is situated 4 km from the district of Kandilli, which was at the centre of the impact zone of the 2004 earthquake. Therefore, the settlement was severely affected, and 96 residences were recorded as heavily damaged or collapsed (Göksoy et al., 2004). As a result, the settlement was reconstructed at the other side of the village road (Fig. 10). In total, 160 residential units were built in the relocated settlement, and eight in the former settlement. However, during the fieldwork, it was noted that in the relocated settlement, the number of unoccupied houses was quite high and many were only seasonally occupied. According to the 2011 TUIK national census, the village has 314 permanent inhabitants.

The village was visited on 31st August 2013 and despite the large number of houses, due to the reasons mentioned above, only 11 participants were found to complete questionnaires. The findings revealed that six participants are pensioners and one stated that he sold his livestock after the earthquake and has not engaged in animal husbandry since then. Four participants indicated they are solely dependent upon animal husbandry, and one indicated he works as driver and has no

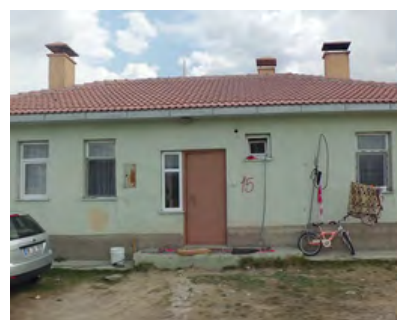


Figure 9 from top-down: the satellite view of the new settlement of Tebrizcik; a view from a single-story house which is seasonally occupied; a view from a two-story house; and, a view from a two-story house with an added garage next to it.

livestock. Accordingly, five participants actively use their barns, and four use it for storage. One participant had allowed his neighbour to use the barn for free as he has no livestock. One respondent used their barn as a residence. In addition, one participant had added a room to his house, and one renewed the drain pipes. Adding a porch to the entrance, refreshing paint on interior walls, and renewing the interior doors were the most common alterations. One stated he had decided to apply extra insulation to the roof as soon as he can afford to do so. Regarding house loans, three participants clearly stated that a village house would never be as worth as much as the amount of the loan and, given their low income, the amount is unaffordable.

Alaca

The village is situated at a quite remote area that is accessible only via the village road, 5 km after Tebrizcik, and 11 km from the highway. The earthquakes in 1924, 1983, and 2004 heavily damaged the village (Anonymous, n.d.). The settlement was not relocated despite the severe damage the 2004 earthquake caused, with 87 houses recorded as heavily damaged or collapsed (Göksoy et al., 2004). A total of 106 buildings were reconstructed, mostly nearby the collapsed buildings. The village has 444 inhabitants according to the 2011 TUIK national census, and most are permanent occupants.

The village was visited on 31st August 2013, and 20 participants contributed to the study by completing questionnaires. The findings revealed that none of the participants had repaid their loan. Furthermore, only two participants stated that they thought the house was worth the amount of the loan; five strongly disagreed their house was worth the amount of the loan and mentioned the poor quality of the houses and the conditions of the rural settlement, which is not as desirable as an urban area according to their opinion.

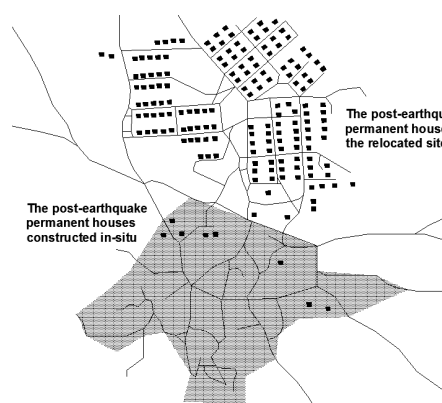


Figure 10 from top-down: the satellite view of Tazegul; the abstract map shows the locations of the post-earthquake permanent houses built in the former and the relocation site; a view from a two-story house; and, a view from the stairs poorly constructed.

Animal husbandry is the dominant source of income of the villagers as 11 of 20 have livestock. The stock sizes vary from 13 to 30 cattle. However, two participants stated that they gave up animal husbandry after the earthquake due to the loss of livestock and the irregular income it provides, which was generally insufficient according to their opinion. Thus, including these two, five respondents work in different jobs; one is a market owner and the others are construction workers. Six participants are pensioners, but two also have livestock as another source of income. Accordingly, most barns in the village are properly used. Seven respondents indicated they own barn units built by the state, two do not have a barn at all, and two built an additional barn on their own due to the insufficient space provided by the state-built barns. Five of 20 use their barns for storage since they do not have livestock. 4 stated that they rarely use the barn, and two participants had transformed their barn into residence.

Regarding alterations, three participants had joined two rooms to create one larger room. Six participants had renewed the interior doors, and two had replaced the floor covering with wood laminate. All of the participants had refreshed the paint on interior walls, and some had also refreshed the paint on the exterior of their house. All had added a simple porch or built an extension to the entrance of their house. In Figure 11, the third image shows a highly exceptional example of an extension to cover the entrance, which was built in a way so as to provide a gate from the front yard to the backyard of the house. The last image is a simpler extension was built as storage and a baking room between two buildings. Furthermore, during the fieldwork, it was observed that the quality of structural material used for and the workmanship of the post-earthquake permanent houses are quite poor. Particularly, most of the exterior stairs of two-storey houses had large cracks and suffered fallen plaster.



Figure 11 from top-down: the satellite view of Alaca, the abstract map shows the locations of the post-earthquake permanent houses built; an example of largely built extension in the entrance; the additional unit built as storage and baking room between two houses.

Van

The background

Demographic characteristic

Van is one of the most underdeveloped provinces of Turkey, also of the region. In 1945, it was the 23rd developed province of the country; however, in 2000 it was 67th among 81 provinces and according to the 2011 Socio-Economic Development Ranking Survey of Provinces and Regions, it is 75th among 81, and one of five most underdeveloped provinces of the region (UNDP-TR, 2012). Despite this, the population of Van is the largest of the region, as of 2008 it exceeded 1 million. Further, the distribution of rural and urban population is quite balanced as the proportion of the rural is around 47.8% between 2007 and 2012. Considering 578 villages it has, the average population per one village is 870, which is far higher than that of Erzurum (277 per 968 villages), and Erzincan (177 per 529 villages). Table 1 shows the increase in population between 2007 and 2013. The increase of population in 2007-2008 can be explained by the rapid migration to Van from the neighbour provinces due to the socio-economic indicators.

Table 1 The change of the Van population in the last five years (TUIK, 2013).

	Total population		Urban areas		Rural areas	
2007	979,671		511,678		467,993	
2008	1,004,369	24,698	514,481	2,803	489,888	21,895
2012	1,051,975	47,606	548,717	34,236	503,258	13,370
2013	1,070,113		Not available		Not available	

The average income per capita is 27.4% of the national average of Turkey as of 1997, which is equal to \$3690. Animal husbandry is in the first place as source of income for most of the rural population in Van as it has a share of 58.4% in the agricultural economic output, according to the data from 1991 (SPO, 2000). The reason underlies that 70% of the lands of Van is suitable for pasture, and it has also the third largest complex of meat and meat products in the country (Anonymous, n.d. *Tarım ve Hayvancılık*). Furthermore, unlike any other province in the region, the fishery sector plays an important role in the province as it benefits from the Lake Van and Ercis. The annual production of fish provides one third of whole fish market in Turkey, since there are 24 fish farming facilities throughout Van. Cultivation is not effective in the province, since only 36% of the fertile lands are actively in use, which is 82% of the province (Anonymous, n.d.).

According to the 2012 national statistics of TUIK, the literacy rate for 15-year old and above is 51% of the total population. The illiterate population for the same age limit is 76,731, 58% of this lives in the rural areas. What is more critical is that 80% of the overall illiterate population is women, and 79% of the illiterate rural population is women. The illiteracy rate of women is 3.85 times of men in the rural areas, and 4.72 in urban areas. The distribution of different education levels is provided in Table 2, which proves the disadvantages of women in Van.

Table 2 The education levels of the population in the rural and urban Van (TUIK, 2013).

	Primary school		High school		University	
	Women	Men	Women	Men	Women	Men
Urban	32,824	25,851	21,631	46,370	9,315	19,058
Rural	24,206	37,053	5,617	14,518	1,396	3,697

The table indicates that rural population is largely composed of people completed primary school, and there is a sharp decrease in further education levels comparing to the urban population. The reason why the number of women is higher than men at primary school level was explained before in the case of Erzincan. In this regard, Van is just another example of the region that put women in a disadvantaged position due to the regional cultural characteristics. However, between three provinces focused in this study, Van shows more similarities with Erzurum in terms of such demographic characteristics. It should also be noted that the people with higher education, particularly the university graduates, mostly work in the urban area even though they live in rural settlements. Most often it turns out a migration from rural to the urban as they are more attracted to the urban, which sharpens the discrepancies between rural and urban as a result.

Geographic characteristic

The province of Van is the 6th largest in Turkey with its 19,069 km² area. The province is situated on a mountainous area, particularly in the southeast and southwest, that forms 53% of the area. The highest mountain in the southeast is the Başkale, which reaches 3668 m, and the İhtiyarşahap ridge forms the southwest of Van and its highest mountain is the Kepeç, which reaches 3634 m. It has also large plateaus and they form 33% of the province. There are two large basins; the one is the Van basin, and the other is the Erciş basin. The Van basin is on the east of the Lake Van, and situated at the altitude of 1727 m. The area of the basin is approximately 150 km² and the city centre is located nearly on the half of the basin. The other large basin is the Erciş, which also has an area of 150 km² and it is situated on the north of the Lake Van. The district of Erciş is located in the basin and it is the second largest urbanised area in Van. The Lake Van is the largest in Turkey with its 3712 km² area and it is situated at the altitude of 1646 m, and it is deep as 451 m. The Lake Erçek is situated on 30 km east of the Lake Van and its area is nearly 100 km². The altitude that it is located is 1803 m. Both lakes have extremely high ratio of salinity and rich of sodium carbonate; therefore, only few species of fish survive (Britannica, n.d.; Anonymous, n.d.). The climate around the Lake Van is milder than the rest of the province, and its average annual temperature is 9⁰C. Terrestrial climate is harsh during the winter as the snow remains on ground for more than two and a half months. Snow and rain falls averagely last 85 days in a year and at least half of this is the snow fall. The inner areas have frosty days that last 125 days in a year, which starts from October. July is the warmest with averagely 22⁰C (Kalelioglu, 1991).

Due to the mountainous structure, rural settlements are mostly located on quite small basins between the skirts of the mountains, particularly the southern villages. The villages are generally accessed via village roads; however, there are a few villages in and around the Van and Erciş basins that can be accessed directly via the highway. The urban area of Van is similar to Erzurum as it was not expanded through a planned settlement layout. Considering the migration from rural settlements within Van and the neighbour provinces, the city centre is far from the capacity of providing a good quality of urban settlement, which seriously suffered from the earthquakes in late 2011.

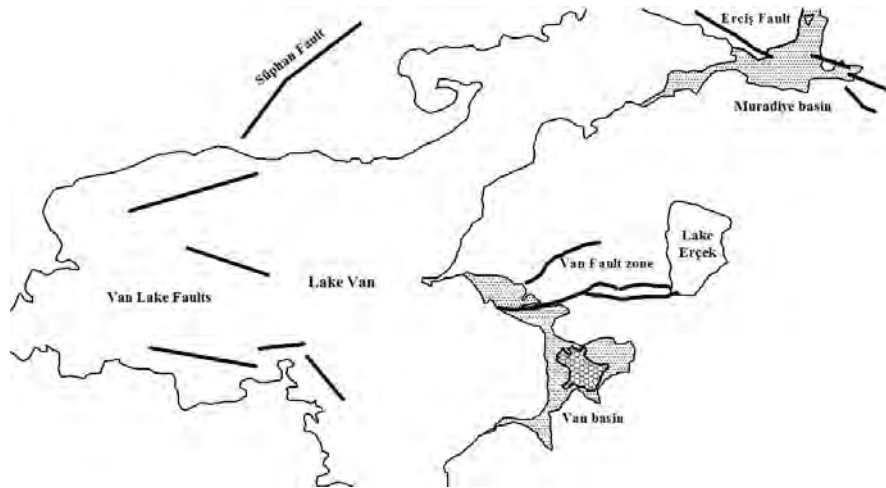


Figure 1 The fault zone affecting Van (The map shows nearly an area of 140x70 km² and drawn from the Turkey Active Fault Maps of the General Directorate of Mineral Research and Exploration of Turkey).

Seismic activity

Van has it experienced severe earthquakes in the last century. The most significant earthquakes took place in 1908 (6.0 M), 1924 (6.8 M), 1930 (7.6 M), 1935 (6.2 M), 1941 (5.9 M), 1966 (6.5 M), and 1976 (7.3 M) (Fielding et al., 2013). Despite there is no long and large faults as in Erzincan and Erzurum, relatively short and small faults in the area, particularly in the east and north of the Lake Van, generate destructive earthquakes. However, such seismic activity is the result of the northwards movement of the Arabian Plate, which moves averagely 18 mm per year. This movement often activates the strike-slip faults in the area that Van largely covers (Moro et al., 2014). The most active faults in Van are the Çaldıran fault, the Erciş fault and the Van fault zone between the Lake Van and Erçek (Fig. 1).

The 1976 earthquake is significant in the history of Van since it was the last severe earthquake took place in the 20th century. It stroke the district of Çaldıran on 24th November with magnitude of 7.3 M_w, and caused 3870 casualties and over 5000 injuries and left nearly 50.000 people homeless both in rural and urban areas (Gülkan et al., 1978; UNDRO, 1982). The fracture that the earthquake generated was 55 km long, and in few villages over 200 cm lateral slips were measured

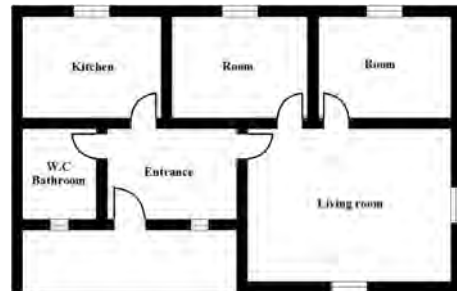
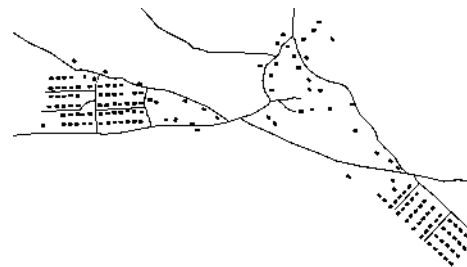


Figure 2 The settlement layout of the village of Cubuklu in Çaldıran, the village built after the 1976 earthquake (the map drawn from Google Earth); the plan of a reinforced concrete house built after the 1976 earthquake in Van; the exterior view of the house, currently unoccupied.

(Gülkan et al., 1978). Serious damage occurred in the built environment as nearly 14.450 units including residential, commercial and governmental, and more than 9.000 of this in the villages. Despite the total financial loss, \$3.2 billion, particularly with the foreign aids, the total cost of the recovery was \$17.4 billion (UNDRO, 1982). Some of the survivors were relocated to the western Turkey by the state to provide temporary accommodation; but some resisted to stay in Van by indicating the livestock they have. In such cases, the state offered to buy the livestock of families (Milliyet, 1976).

The earthquake destroyed nearly all of the villages in Çaldıran and Muradiye since all of the houses were stone and adobe masonry. Therefore the villages were rebuilt from the beginning by employing two different permanent housing reconstruction strategies. The first strategy was to build 10000 units of prefabricated houses, which were completed in one year. The units were consisted of timber panels as well as asbestos panels (UNDRO, 1982). However, it must be underlined that this type of material is no longer acceptable in the construction sector in any case due to the health issues, as the use of asbestos was banned in 1980s in most countries. This type of building was preferred based on the experience of another earthquake took place just a year before, in 1975, that stroke the province of Hakkari, which is in the south of Van. 5805 prefabricated units were built after this earthquake, which were donated by the numerous foreign countries, particularly by Libya (Mitchell, 1977). Regarding the amount of the donations, there was a considerable stock of prefabricated houses, which was, as a result, used for the reconstruction of Van in 1976. The strategy adopted for the reconstruction after the 1976 earthquake was criticised in terms of rejecting the local knowledge and not providing any support for the reinforcement of the traditional rural houses. Relocation of villages was a decision widely



Figure 3 from top-down: the satellite view of Bakraçlı before the earthquake; the satellite view after the earthquake with the relocation site under construction; a view from the relocation site; and, a view of a house under construction in the relocation site.

applied (UNDRO, 1982; CEDIM, 2011). The second strategy was to build single storey RC frame structures with hollow brick masonry infill walls, and they were reconstructed either by the contractors or the owners.

Some problems were highlighted in a report written by the registered architects and civil engineers after they visited the field in July 1977. They reported that despite it was promised to complete the houses by October 1977, there were 34 villages in 100 in Muradiye that were not bided to start the reconstruction. Further, due to the poor village roads, the reconstruction process was quite slow in some villages. They issued the process of damage assessments as well and stated that some villages with minor damaged houses were entitled for the reconstruction project for political reasons. The house plans were found inappropriate by the reporters as well, since they lacked of providing required space for large families and barns for livestock. Regarding the structural quality of houses, the contractors were found responsible for the poor quality of concrete used. In the report, it was stated that the foundations were applied as thin layer of cement on top of compacted sand on granular fill, whereas it was planned as 15 cm granular infill, 10 cm concrete slab and 3 cm cement layer. Besides, regarding the climate of the area, each house should have been built at the height of 50 cm from the ground to avoid flood and freeze, but most were built at the same level with the ground. According to the reporters, it was the fault of lacking control of the contractors that led them not abide by the plans (IMO, 1978).

There is no further report or study found on these houses, but they are still occupied in most villages around Çaldıran, and the village of Çubuklu is one of them. The settlement layout of the village is illustrated in Figure 2, which is a quite large village located at 20 km to Çaldıran. The house plan is drawn according to the buildings still standing; their exterior view and current conditions are also presented.

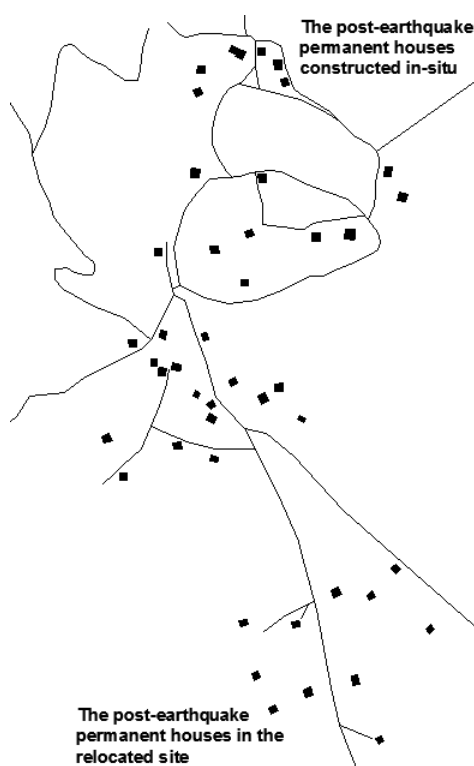


Figure 4 The satellite view of Gedelova and the abstract map showing the locations of the post-earthquake permanent houses built.

*The sampled villages***Bakraçlı**

The village is situated 6 km from the city centre and, according to the 2011 TUIK national census, it has 1,243 inhabitants. However, the 2012 national census revealed that the population of the village decreased to 1,186, which can be interpreted as a result of the earthquake. Although more than a year had passed when the fieldwork was carried out in the village, the reconstruction of permanent houses was still in progress (Fig. 3). It was observed that construction work on the planned relocation site was still in the early stages. While some permanent houses had been rebuilt in and around the existing settlement, only a few were occupied, while the rest were waiting on completion of interior finishing at the time of the study. The authorities decided to reconstruct 51 houses in the relocated settlement and 17 or 18 in the existing settlement. Regarding the delay in reconstruction, the villagers mentioned a disagreement with the contractors previously hired as they had left houses incomplete. As a result of the delay, there were families who were still residing in their former houses or in container units.

The village was visited on 25th August 2013, and only two participants from the existing settlement were located to complete surveys due to the delay in the reconstruction process. However, only one had moved into his house, and the other was waiting for the completion of the interior finishes and was still living in his damaged house. It should be noted that the relocation site is almost at the top of a nearby mountain. Thus, its altitude is approximately 3200 m, which results in conditions that are more windy and colder than the previous location of the village and may cause villagers to complain in the future.

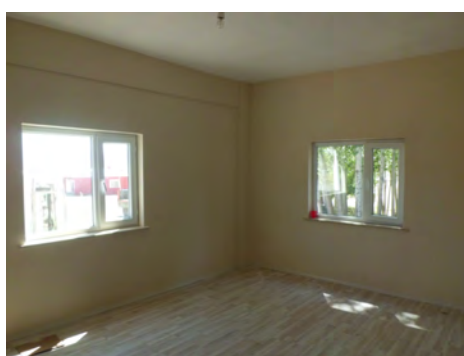


Figure 5 from top-down: a participant from Gedelova with her neighbours and sitting with the researcher's father; a view from a permanent house under construction in the village; a container unit for temporary shelter still in use; a view from a permanent house about to be completed.

Gedelova

The village is situated 22 km from the city centre and is 6 km from Kozluca, the nearest village. According to the 2011 TUIK national census, it has 371 inhabitants. However, the national census in 2012 revealed that the village has 402 inhabitants, an increase of 31, residents, which may be due to the completion of post-earthquake permanent houses. A total of 47 houses were built and 11 were relocated less than 500 m away from the village (Fig. 4).

The village was visited on 25th August 2013, and 15 participants were surveyed. Based on the findings, animal husbandry is the main livelihood for most participants. One respondent indicated he works part-time in a car park in the city centre. Two of the 15 respondents stated that they had migrated to other cities (Mersin and Gaziantep) for a short period of time, staying mainly in tents and container units as the rest of the participants. Regarding their livelihood, four participants mentioned that the amount of the loan they received was too high to pay back, and their house was not worth its compared to their previous construction experience. Further, they stated that they had to pay an extra 6,000 (~\$2,885) to the contractor to have a house with three rooms. The top image in Figure 5 shows the residents surveyed sitting with the researcher's father at the entrance. The second image shows a house under construction, whose beneficiary still occupies the container unit shown in the third image. The last image is the spacious living room of a house with three rooms that is ready to be delivered.

Kasımoğlu

The village is situated 23 km from Van city centre, 8 km from the village of Ozkaynak, and 10 km from the village of Yalnızzağaç. The land on which the village is situated is one of only a few green areas in Van due to the stream that passes through. The

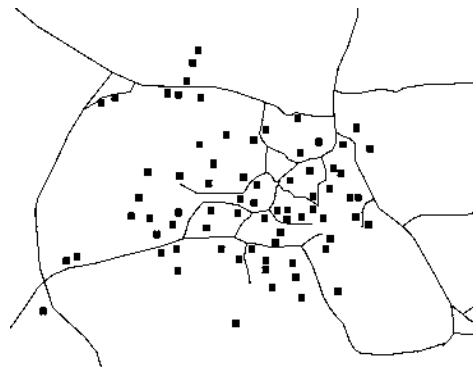


Figure 6 from top-down: the satellite map of Kasımoğlu; the abstract map shows the locations of the post-earthquake permanent houses built; a view from a permanent house under construction; and a view from the nearby former house still occupied by the same owner.

population of the village was 517 according to the 2011 national census of TUIK and increased to 535 in 2012. This increase may be the result of the completion of reconstruction of the new houses. A total of 72 houses were built nearby the former houses by different contractors.

The village was visited on 27th August 2013, and only three participants were available to complete questionnaires, with one also interviewed. None of the participants had migrated out of Van and had stayed in the tents and container units provided. However, while reconstruction of houses had been completed in half of the village, a number of houses were still under construction. According to the sole interviewee, the reason for this delay was the involvement of different contractors in reconstruction. He elaborated that some contractors were good and completed the job in the time promised, but some were irresponsible and delayed construction until they received the loan amount from state officers. Accordingly, one participant who lives in a completed house was quite satisfied with his house and its quality and stated that the house was worth the amount of the loan. However, the interviewee who suffered the delay stated that the houses were not of the quality expected and were definitely not worth the amount of the loan, and also mentioned he is a construction worker who mostly works in the city centre. He was still living in his moderately damaged house and close to the one under construction (Fig. 6).

Kozluca

The village is 25 km from Van city centre and 3 km from Yalnızağaç, the nearest village. There are 19 houses built by contractors, and the village has a small population of 141 according to the 2012 national census of TUIK. However, data from TUIK reveals that the village has experienced a sharp decrease in its population since 2007, when the population was 409. In the year of the earthquake, the population was 170, which apparently

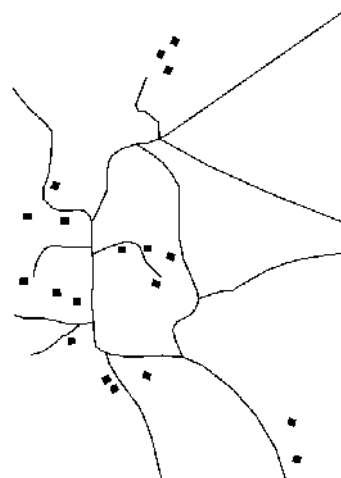


Figure 7 from top-down: the satellite view of Kozluca; the abstract map shows the locations of the new houses built; and, a traditional house occupied despite the owner had a newly built house as well.

continued to decrease because of the disaster. The village was visited on 27th August 2013, and 10 participants were surveyed.

Animal husbandry is the main source of income for participants, with one respondent indicating he only one works in the construction sector. Regarding the temporary shelter experiences of participants, most had stayed in tents and container units and one had migrated into Muğla since they were dislocated by the state. There still were several container units in front of the houses. Eight participants indicated they were satisfied with their houses, but two complained about the amount of the house loan. One participant also complained about the damage assessment procedure as his house was marked as moderately damaged and thus he was not able to receive a post-earthquake permanent house. His father, who was the reeve of the village, was allocated a barn, so he transformed the barn into a residence where he and his father could stay while he struggled with the bureaucracy (Fig. 8). In contrast, a few families were lucky enough to be able to repair their former houses, even though they had a newly built house as well (Fig. 7). Some had already applied alterations to their houses such as covering the three-sided, small open terrace at the entrance with wood or PVC profile windows or even extending the area of their terrace by pouring concrete (Fig. 8).

Özkaynak

The village is 22 km from the city centre and access from the highway is 3 km. Since the entire village was severely damaged by the 2011 earthquakes, 50 houses were reconstructed in a relocated site, which is at a higher altitude and less than 1 km from the former settlement. The village of Ozkaynak has an increasing population according to data from TÜİK. In 2007, it had 363 inhabitants, and in the year of the earthquake it had 397. By 2012, it had 403 inhabitants.

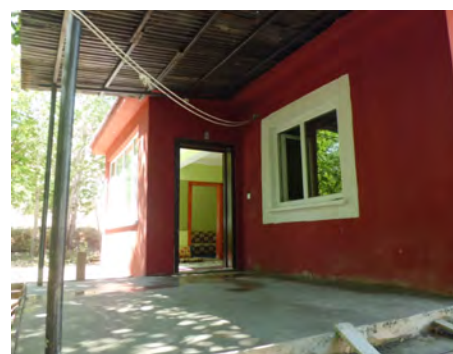


Figure 8 from the top-down: The view of the moderately damaged house that was still occupied by the owner; the barn unit transformed into a residential unit by the same owner; the extended terrace area both by closing the three-sided entrance and pouring concrete for further floor; and, another example of creating space from the entrance.

The village was visited on 27th August 2013, and 15 participants were surveyed. Regarding the temporary shelter experiences of the participants, five, who were relatives as well, had migrated to Batman after staying for a few months in tents and container units. One participant migrated to Istanbul and one to Diyarbakır. The participants have quite different sources of income. For example, two work in manufacturing, two work in construction, and two work as bus drivers. One participant is a pensioner and another participant is the imam of the village. One participant is a state officer. The remaining participants have livestock as their single source of income.

As TOKI made an attempt to build light steel frame structures, and this is the first time that the residents had encountered this material and type of structure, their opinions regarding this were surveyed. Six participants were satisfied with the material, while nine were dissatisfied and stated that they would have preferred an RC structure, which they deemed more resistant to earthquakes. In comparison with the other villages, in which only RC buildings were built, it is important to note that the houses in Ozkaynak and Topaktas were delivered in relatively better condition in terms of the completeness of the interior finishing and better physical conditions. The introduction of such a construction technique without addressing the questions of local people is discussed in chapter 7.

However, a few RC buildings under construction by the contractor were observed around the village. One participant explained that a few villagers had insisted on this, so the authorities allowed them to be built (Fig. 9). Despite delivery only a few months before, some residents had already made alterations to their entrances.

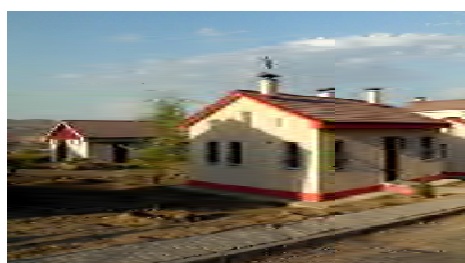
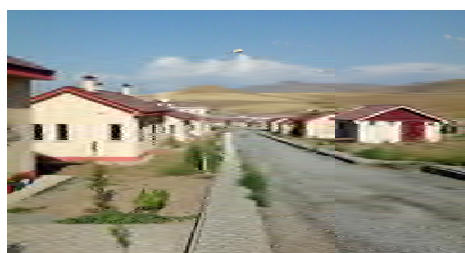
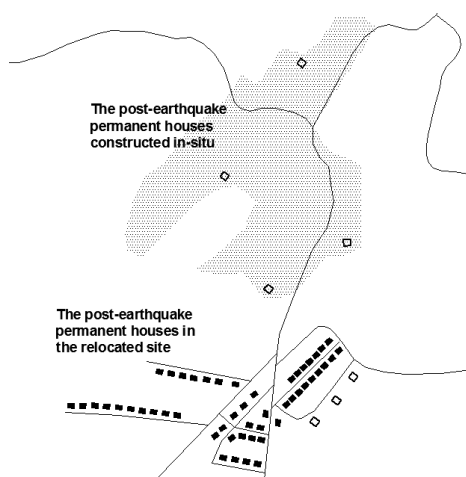


Figure 9 from top-down: the satellite view of the former and relocated settlement of Ozkaynak; the abstract map shows the locations of the post-earthquake permanent houses; a street view from the new settlement; and a closer view from a new house.

Topaktaş

The village is situated 20 km from the Van city centre and was heavily damaged by the 2011 earthquakes. Thus, the entire village was reconstructed on a relocated site, which is near the highway and nearly 2.5 km away from the former settlement. This village was reconstructed under the control of TOKI and was united with the village of Dağönü. Dağönü is almost 17 km away from Topaktaş, and it was decided to build 75 houses for Dağönü residents on the relocated site of Topaktaş. For the united settlement, 175 houses in total were built on the relocated site of Topaktaş (Fig. 10). As a result, the population of the new settlement is 762 according to the 2012 national census of TÜİK, whereas it was 571 in 2011 for Topaktaş only.

The village was visited on 28th August 2013, and 23 participants were surveyed. Findings revealed that seven of 23 temporarily migrated out of Van after staying in tents for a few months. They migrated to Batman as they either preferred to do so or because they were temporarily relocated by the state and stayed in a guest house in that province. Two respondents migrated to Istanbul for a short period of time.

The sources of income of the villagers vary as four are pensioners, five are state officers, one is teacher, one is nurse, two are security staff, three are bus drivers, three are manufacturing workers, one works in the construction sector, two work in a market, and two have rentals from their small stores in the city centre. Only one participant indicated he is dependent on agricultural activity.

Twelve respondents indicated they are satisfied with the construction materials used, while 11 indicated they were dissatisfied. However, it is important to note that some of the satisfied participants stated that their damaged building was of RC construction and was heavily damaged. In contrast, some of the dissatisfied respondents stated that if the reconstructed houses were



Figure 10 from top-down: the abstract map shows the relocations of Dagonu and Topaktas; the abstract map shows the relocation of Topaktas; the satellite view of the new settlement of Topaktas; and, the abstract map shows the locations of the houses built.

built with RC construction, they would be able to add another floor (even if they are not allowed to do so). Furthermore, most participants, both satisfied and dissatisfied, commonly mentioned that the buildings were not worth the amount of the house loan, which was for a higher amount than the loan for concrete buildings.

In Figure 11, the top image is a birds' eye view of the relocated settlement of Topaktas. The second image is a street view of the settlement; the third image is the exterior view of a house that has never been occupied. In the last image, a participant is photographed while she talks to the researcher's father, who is sitting by the door.

A short visit was also made to the former settlement. Many heavily damaged buildings were observed, which were built with local materials and traditional construction techniques. A couple of one-storey RC buildings constructed prior to the earthquakes were observed. They mainly suffered in the earthquakes due to the structural faults they had. Nevertheless, the only three-storey RC frame building in the former village was still inhabited.

Yalnız ağaç

The village is situated 25 km from the city centre and 3 km from Kozluca, the nearest village, and is accessible only via the village road. According to the 2011 national census of TÜİK, the population is 307; the population decreased to 270 in 2012, likely as a result of the impact from the earthquakes. A total of 45 houses were built at the existing location (Fig. 12).

The village was visited on 26th August 2013, and 10 participants were surveyed. Regarding the post-earthquake temporary shelter experience of participants, four of 10 stated that they stayed for a few months in Van and then migrated temporarily to



Figure 11 from top-down: a view from the new settlement of Topaktas village; a view from street; a post-earthquake permanent house built as light steel frame but not occupied; a participant from the village talking to the researcher's father sitting at the door.

other cities including Istanbul, Antalya, and Mersin. Six mentioned that they stayed in tents and container units until reconstruction was completed. Two stated that they would have migrated as well if they did not have a large household and livestock. The source of income of most villagers is animal husbandry, and one participant stated that her husband was away in Istanbul looking for a job to provide a regular source of income.

One participant complained about the damage assessment results for his former house, which were very different than the results for his parents' newer house. He stated that although his house was seriously damaged, it was evaluated as only moderately damaged, which prevented him from being a beneficiary. He complained strongly that the family now had to live together in a small house. His former house was still standing, but had large cracks in the corners of the walls and doors (Fig. 12). Furthermore, as the roof was earth-infill supported by large timber logs on masonry walls, there also were serious cracks in the walls that continued to the floor. Based on the damage assessment experience of the researcher, the building should have been evaluated as heavily damaged due to the size and location of the cracks. Considering the size of the house, the amount allocated for repairs would not have covered the total cost of repairing and reinforcing the structure. The respondent's experience implies that the assessments were largely subjective and based on the assessor's perspective.



Figure 12 from top-down: the satellite view of Yalnizagac; the abstract map of the house locations; a general view from the settlement; and, a view from a damaged traditionally built house.

The outputs of Cronbach Alpha reliability test

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.902	.898	8

Item Statistics

	Mean	Std. Deviation	N
Q11	4.51	1.006	232
Q12	4.62	.964	232
Q13	4.62	1.021	232
Q14	.98	.383	232
Q15	4.53	1.237	232
Q16	4.55	1.315	232
Q17	4.46	1.389	232
Q18	4.41	1.480	232

Inter-Item Correlation Matrix

	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18
Q11	1.000	.733	.553	.180	.497	.474	.406	.416
Q12	.733	1.000	.654	.193	.528	.516	.455	.431
Q13	.553	.654	1.000	.193	.629	.561	.475	.447
Q14	.180	.193	.193	1.000	.257	.423	.405	.394
Q15	.497	.528	.629	.257	1.000	.805	.757	.709
Q16	.474	.516	.561	.423	.805	1.000	.852	.815
Q17	.406	.455	.475	.405	.757	.852	1.000	.906
Q18	.416	.431	.447	.394	.709	.815	.906	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q11	28.16	41.263	.585	.562	.898
Q12	28.06	41.040	.637	.634	.894
Q13	28.06	40.425	.645	.547	.893
Q14	31.69	47.713	.374	.215	.913
Q15	28.14	36.163	.816	.724	.877
Q16	28.12	34.713	.865	.809	.871
Q17	28.22	34.343	.834	.866	.875
Q18	28.27	33.894	.798	.829	.880

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.854	.874	47

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q58	144.91	640.886	.546	.647	.848
Q59	146.72	652.903	.258	.481	.853
Q60	147.61	663.604	.197	.362	.854
Q11	144.73	659.431	.400	.716	.851
Q12	144.64	659.716	.395	.760	.851
Q13	144.62	658.956	.405	.678	.851
Q14	148.26	673.832	.334	.343	.853
Q15	144.69	640.584	.637	.810	.847
Q16	144.66	635.517	.694	.867	.846
Q18	144.78	630.302	.687	.903	.845
Q17	144.74	632.424	.700	.919	.845
Q22	145.56	662.174	.274	.660	.852
Q23	145.02	662.299	.325	.735	.852
Q24	145.06	663.296	.259	.458	.853
Q25	146.43	665.213	.201	.391	.854
Q26	145.22	662.265	.222	.723	.853
Q27	145.00	658.134	.314	.757	.852
Q28	144.80	651.228	.430	.631	.850
Q29	146.38	644.228	.359	.425	.851
Q30	146.26	640.385	.350	.925	.851
Q31	146.36	637.908	.371	.931	.850
Q33	149.10	681.737	-.044	.268	.856
Q32	147.47	647.061	.239	.546	.855
Q34	145.96	628.556	.446	.533	.848
Q36	148.01	660.972	.165	.262	.855
Q38	146.00	637.848	.307	.972	.853
Q39	145.94	639.388	.298	.970	.853
Q40	146.09	658.347	.172	.397	.856
Q42	144.48	663.836	.356	.725	.852
Q43	144.79	658.248	.329	.651	.852
Q45	144.60	663.412	.321	.717	.852
Q44	145.11	662.028	.281	.485	.852
Q50	144.89	664.122	.320	.966	.852
Q52	144.89	660.406	.358	.929	.851
Q51	144.90	661.676	.348	.979	.852
Q53	144.92	659.630	.340	.864	.852
Q63	147.10	637.636	.321	.730	.852
Q65	147.06	631.204	.361	.884	.851
Q64	146.86	627.824	.387	.901	.850
Q67	149.25	680.547	-.008	.623	.855
Q66	148.79	669.393	.325	.608	.853
Q69	147.22	663.235	.146	.322	.856
Q68	149.00	675.590	.078	.372	.855
Q78	146.19	656.940	.325	.492	.852
Q77	146.09	634.305	.441	.792	.849
Q79	146.09	631.656	.472	.761	.848
Q80	148.39	683.971	-.071	.456	.860