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The Perception of Seismic Risk Among People and Its Influence on Building Code Compliance in Gokarneshwor Municipality

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Abstract
Nepal lies in an active seismic region. It has experienced many destructive earthquakes in the past. To protect lives and property, compliance with building code and bye-laws is one of the effective mitigation measures for disaster risk reduction. So, it is important to convince people that the implementation of these rules will help to make their building safe and worthwhile. Often people base their decision regarding safety and mitigation measures on their own risk perception. So, enhanced seismic risk perception can have positive contribution to improve awareness regarding safer construction and help in better compliance to building code and bye-laws by increasing awareness.The study aimed to examine the seismic risk perception level and identify several factors influencing it and explore the linkage between seismic risk perception and building code compliance. Based on Cochran's method, 250 households' samples were collected from Gokarneshwor Municipality using the simple random sampling method. Questionnaire surveys were conducted which included questions about socio-demographic profile of the community which included gender, age, education, income level, occupation, ownership status. It further included the indicators of perception of seismic risk which was derived from literature review and also included basic building-related information. Quantitative and qualitative method was used in the study. Quantitative approach used statistical methods to determine the risk perception level. Co-relation was used to determine the significant factors among risk perception indicators. Comparison of mean (T-test, Anova test) was used to explore impact of socio-demographic variables on risk perception. Similarly Chi-square test was done to check statistical significance between enhanced seismic risk perception and code-compliance. Qualitative approach used people's views to explore ideas related to seismic risk perception. The seismic risk perception level of people was found to be fairly good. Knowledge, experience of past disaster, trust in community and authorities, attitude toward the vulnerability of building significantly affected the risk perception of people. Similarly compliance with building code and seismic risk perception showed significant association. Thus, enhanced seismic risk perception has potential in influencing building code compliance.

Keywords
Seismic Risk Perception, Building Code and Bye-laws Compliance

1. Introduction

Nepal is prone to various types of natural disasters including earthquakes. It is ranked as 11th vulnerable country to earthquake [1]. Population growth and increasing trend of urbanization in such areas indicates that earthquake impacts on people will increase in the coming years [2]. Earthquakes kill thousands of people every year around the world and millions are still exposed to earthquakes threats due to the vulnerable environment [3]. Gorkha Earthquake of 2015 caused massive damage in Nepal. It is not a onetime event; Nepal has faced several destructive earthquakes in the past and likely to face in future. Most of the building collapsed because they were inadequately designed for earthquake resistance. Poor compliance with building codes and low risk perception can increase the vulnerability of the buildings [4]. Building codes is considered as an effective tool to protect lives and property against earthquake [5]. Risk perception has gained good acknowledgement in disaster literature [6]. The success of any risk reduction action depends on people's understanding and perception of the risks.

Risk perception is the subjective judgment of people about the characteristics and impact of a risk. It is important to understand how people perceive risks of seismic hazards because it gives insights on how they would behave during an occurrence of earthquake and also determines the willingness of people to apply the mitigation measures. Understanding risk perception is an important step toward creating programs and measures to raise awareness for safer communities and workplace [7].

Most of the private houses in Nepal are built by owner using local contractors and masons [8, 9]. There is a legal mechanism for supervision and monitoring for implementation of building code by local government but it often lacks strict implementation or penalty system for non-compliance cases. After 2015 Gorkha Earthquake, there is realization for safer housing. During the past five years of reconstruction several efforts are made to ensure safer construction. The success of these mitigation and risk reduction measures depends on people's understanding and perception of the risks and their participation in the implementation and management of them. There is proper building code and bye-laws but they are not generally adopted due to several factors like inadequate knowledge, lower risk perception, and complexity in process of implementation of codes etc. There are pre-existing vulnerable buildings which do not meet standards of seismic resilient construction guidelines. And even there are non- Compliance issues in newly constructed houses due to several reasons like ignorance, lack of knowledge etc. The purpose of this research is to study the seismic risk perception, determine the factors influencing it and exploration of role of seismic risk perception on compliance with building codes and bye-laws.

The major research questions are:

i. What is seismic risk perception level of people and factors affecting it?

ii. What is the people's perception regarding implementation of building permit process for building code and bye-laws compliance?

iii. How seismic risk perception influence on compliance with building code and building bye-laws?

The main objective of this research is to analyze seismic risk perception among people,identify factors affecting it and explore influence of it on building code and bye-laws compliance.

2. Literature Review

2.1 Seismic Risk Perception

Nepal is among the most vulnerable countries in the world regarding earthquake, ranking 11th most at-risk [1]. Similarly, Kathmandu Valley was ranked in 20th position among cities assessed globally [1]. Risk is seen as the combination of the probability of an event and its negative consequences [10] . Risk perception is the people's personal judgment about the characteristics and impact of a risk. Seismic risk perception is defined as the perceived risk in relation to seismic event. Most of the built environment consists of buildings, which functions to provide safe living environment, economic activities, and support social functions. Thus Performance of buildings against hazards including earthquakes plays important role to build and maintain society [3].

2.2 Factors Affecting Seismic Risk Perception

People's risk perceptions are affected by variety of factors [11]. There are several theories regarding risk perception. Three major theories are: psychological or psychometric theory [11], anthropology or socio-cultural theory [11] and interdisciplinary theory(social amplification)[11]. Literature highlights various factors that influence people's risk perception. Renn and Rohrmann has proposed four contextual levels of risk perception, Chister Svanhn [12] has proposed internal and external factors of risk perception. For this study, interdisciplinary theory is used and factors influencing risk perception are adopted from Hofer and Hamann framework of risk perception [13].

2.3 Building Code

Building code is a set of standard practice for designing and constructing buildings and supported by legislation. Enforcement of it is considered as the most effective tool in earthquakes risk reduction [3, 9]. After the Earthquake of 1988 A.D. there was need for Nepal National building Code. The DUDBC developed the Nepal National Building code (NNBC) in 1993 A.D. with the assistance of UN-HABITAT and first implemented in 2001. In Lalitpur Sub-Metropolitan City and 2005 onward in became

Figure 1: Factors affecting seismic risk perception adopted from Hofer and Hamann model of risk perception

mandatory for all municipalities. There are 23 volumes of codes.

2.4 Building Bye-laws

Building Bye-Laws are legal tools used to regulate ground coverage, height, total built up area, set back etc. to achieve proper development. Building bye laws were developed to ensure greater compliance with the building, planning/zoning and structural requirements. The building bye laws have been in place since 1976, since then several revisions have been made which were expected to be enforced more strictly [14]. But in practice strict implementation is sometimes neglected. Building bye-laws 2073 of Gokarneshwor Municipality was referred for the study.

3. Data and methodology

3.1 Study area

The study area chosen for the research is Gokarneshwor Municipality. The area of Gokarneshwor municipality is 58.5 sq. km. It is located in 27.77 ^{0}Latitude and 85.41^{0}longitudes in the northeast side of the Kathmandu district. It was declared municipality in 2071 BS, 2nd Dec 2014. It consist of both rural and urban areas, so perception of both contexts can be achieved. It consists of nine wards Sundarijal-1, Nayapati-2, Baluwa-3, Gokarneshwor-4 and Jorpati (5-9). This municipality consists of diverse geography, historically important religious places and holy river Bagmati. It is bordered by Kageshwori Manohara municipality in the south as well as west, Shivapuri National Park, Nuwakot and Sindhupalchowk district in the north.

Gokarneshwor Municipality is one of the areas affected by destructive 2015 earthquake. Although the extent of damage occurred in different wards varied, the intensity of earthquake felt by people is assumed to be the same.

Table 1: Classification of National Building codes Source: DUDBC

S.N.	Types of NBC codes	Description
1	International State-of-Art Applicable codes: NBC 000	It is applicable to large buildings. It must comply with existing international state-of-the-art building codes.
2	Professionally engineered buildings. Applicable codes: NBC 101-114, NBC 206, 207, NBC 208	Buildings designed and constructed under supervision of engineers Buildings with plinth area more than 1,000 sq. ft., Buildings having more than 3 stories Buildings with span more than 4.5 m and Buildings with irregular shapes
3	Mandatory Rules of thumb NBC 201, 202, NBC 205	Buildings of plinth area less than 1,000 sq. ft. Building with less than 3 stories buildings having span less than 4.5 m and regular buildings designed and constructed
4	Guidelines of Remote Rural NBC 203, NBC 204	Buildings constructed by local masons in remote areas and not more than 2 stories

3.2 Research Design

The research approach of the study is post-positivist. A mixed method approach was used for analysis. Quantitative approach, correlation was used to see association among risk perception indicators and comparison of mean test (T-test and Anova Test) was used to check difference in mean score of risk perception among socio demographic variables. Similarly, using Chi square test association between categorised risk perception and code compliance was seen. Qualitative approach used views of people and information to explore ideas of seismic risk perception and code-bye-laws compliance. Research matrix was developed on the basis of objectives, research questions analysis process and tools used and

expected outcomes.

Conceptual framework of research is shown in Fig no. 3. Variables of seismic risk perception obtained from literature review were grouped into three Categories for convenience in questionnaire preparation and survey process.

3.3 Sample size and data collection

The required sample size for the study was determined by the formula derived by Cochran's formula [15]. The total population of Gokarneshwor Municipality was 19700.

$$n_o = \frac{z^2 pq}{e^2} \quad (1)$$

where,
n_o = Sample size,
z = selected critical value of desired confidence level (1.96 for 95% confidence level),
p =estimated proportion of an attribute that is present in the population, (0.5 assuming maximum variability).
q = 1-p and
e = desired level of precision (0.06)
The correction formula to calculate the final sample size is given below

$$n = \frac{n_o}{1 + \frac{n_o - 1}{N}} \quad (2)$$

where, N is the population size

Table 2: Sample size calculation

Confidence level	95%
Critical value (z)	1.96%
Population size	19700
Sample size	250

Simple random sampling was used to select sample from the sample frame of Gokarneshwor Municipality, households were selected as sample items and individual people (any member of Household) was sample unit for this research. Primary data was collected from field observation and survey. Questionnaire survey using structured questionnaire was used for primary data collection using mixed mode survey i.e. face-to face interview and phone survey as they both have similar potential to capture people opinion. 250 household data were collected from 9 different wards of Gokarneshwor Municipality. Secondary data was collected from municipal records, government policies and relevant reports and papers.

4. Results and Discussion

To analyze seismic risk perception of people, variables were designed under three broad categories, Socio-demographic, risk perception indicators and building information.

4.1 Socio-demographic profile of the respondents

Table 3: Socio-demographic profile of the respondents

Socio-demographic Variables	Frequency (N-=250	Percent (%)
Gender		
Female	127	51
Male	125	49
Age of respondents		
20-29	18	7.2
30-39	59	23.6
40-49	119	47.6
50 and above	54	21.6
Education level		
No formal education	29	11.6
School	113	45.2
Intermediate Level	56	22.4
Undergraduate	44	17.6
Graduate and above	8	3.2
Income Level		
Less than 15,000	13	5.2
15,000-30,000	62	24.8
30,000-100000	102	40.8
1 lakh +	15	6
None	58	23.2
Occupation		
Government or private service	64	25.6
Business	71	28.4
Labor	20	8
Unemployed/Not working	49	19.6
other	46	18.4
Vulnerable members in family		
No	162	64.8
Yes	88	35.2
Ownership		
Tenant	15	6
Owner	235	94

The genders of the respondents of a sample size of 250 were 51% Female and 49% Male. Age groups were categorized in five groups. Most of the respondents were of age group 40-49(About 48%).

Literature highlights importance of education in disaster risk reduction [13]. In the survey questionnaire, education level was categorized into five categories. Most of the participants (45%) had

Figure 2: Research Design Matrix

S.N.	Objective	Research questions	Variable	Analysis process and Tools	Output
1.	**To analyze seismic risk perception of people**	What is the level of seismic risk perception of people?	Risk perception indicators Knowledge Experience Trust Attitude	**Analysis:** Quantitative Approach **Tools:** Average of Mean Score of Risk Perception Indicators	Level of seismic risk perception
		What factors influence seismic risk perception?	Socio-demographic variable and Risk perception indicators	**Analysis:** Quantitative approach **Tools:** Comparison of mean of risk perception score with socio-demographic variables and Correlation with risk perception indicators	Influencing factors for seismic risk perception
2.	**To analyze perception of people regarding building permit process and code implementation**	What is existing level of awareness of people for compliance with building code?	Risk perception indicators (Knowledge variable)	**Analysis:** Quantitative Approach **Tools:** Mean Score of variable	Awareness level for compliance with building code and bye-laws
		Attitude toward building permit process	Attitude (Opinion regarding building permit process)	**Analysis:** Qualitative Approach **Tools:** Median of variable	Views regarding complexity of building permit process
3.	**To explore association between seismic risk perception and code-byelaws compliance**	Does seismic risk perception influence building code and building byelaws implementation?	Risk perception indicators and Check for code compliance (20% of sample size)	**Analysis:** Quantitative and Qualitative Approach **Tools:** Chi-square: risk perception indicators and building compliance	Relationship between risk perception and compliance with building code and bye-laws

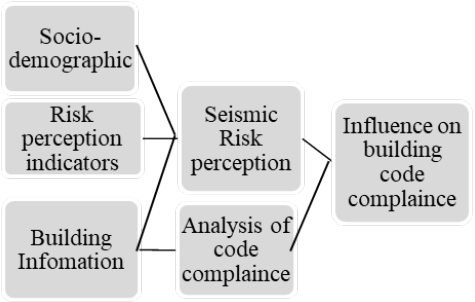

Figure 3: Conceptual Framework of Research

school level education. Economic condition has impact on application of mitigation measures for the safety of houses. Most of the Participants were reluctant to express their real income level, so tentative data was collected. Most of the participants had monthly income level in between 30,000-100,000. Most of respondents were engage in some kind of business activities followed by government or private service. Few families (35%) had family vulnerable family members.

4.2 Seismic Risk Perception Indicators

Seismic risk perception indicators were adopted from Hofer and Hamann model of risk perception and were based on interdisciplinary theory of risk perception.

4.2.1 Knowledge

Knowledge of hazard is important parameter in risk perception [9][13]. Based on the objective and research questions, under this variable questions were designed to examine the knowledge of earthquake hazard, frequency of risk communication, knowledge of earthquake resistant design and construction, familiarity with the building code and bye-laws and effective source of knowledge.

Table no. 4 shows the descriptive statistics of Knowledge. Questions in likert scale (1-5) were

Table 4: Descriptive Statistics of Knowledge Variables

Statements	Mean	Std.D
Knowledge Regarding earthquake	3.66	.739
Risk Communication to the friends and families	2.67	.814
Knowledge on Earthquake resistant building design and construction	3.22	.989
Familiarity with national building code and bye-laws	2.54	.974
Average mean	**3.02(60.5%)**	

designed under knowledge variable. Four statements were used with their respective mean ranging from 2.54 to 3.66 and average mean of knowledge was found to be 3.02 out 5 which show that responses have positive inclination. The table shows that the first statement had the highest mean of 3.66. This indicates that in overall respondents had good knowledge regarding Earthquake hazard. Similarly, fourth statement had the lowest mean value i.e. 2.54 which indicates that in overall people were slightly familiar about the existence and implementation of building code-and bye laws in their area but it was considerably less than other variables.

Fifth statement was qualitative in nature searching for effective source of information. Publicity through different sources was addressed as one of the crucial step in risk communication,orientation program and engineer's advice was seen as effective sources. From the views of respondents it was found that most of the respondents completely rely on engineer's advice.

4.2.2 Experience

Under this variable questions were designed in 5points likert scale to know about the experience, level of past damage, likelihood of earthquake, worry and views regarding government's imitation on earthquake risk reduction by government. Experience of past disaster directly impact perceived risk [11, 13]. All of the respondents had experience of earthquake.

Table no.4 shows the descriptive statistics of experience. Four statements of 5point likert scale (1-5) were used in the table with their respective mean ranging from 2.22 to 2.99 and average mean score of experience was found to be 2.63 is which shows that experience of past earthquake have positive impact. The table shows that the first statement had highest mean statement of 2.99 which indicates in overall people experienced mild damage in the past. Similarly, third statement had lowest mean which explains that people are less worried regarding consequences in next Earthquake hazard. This was because likelihood of destructive earthquake in near future was perceived as less by people.

Table 5: Descriptive Statistics of Experience Variables

Statements	Mean	Std.D
level of damage	2.99	1.326
Likelihood of occurrence	2.42	.916
Worried about consequences	2.22	.988
Satisfied with government's initiation	2.89	.862
Average mean	**2.63 (52.6%)**	

4.2.3 Trust

Trust is one of the strong parameter of seismic risk perception. Under this variable, two questions were designed to get an insight on how people see their community and trust in their local government.

Table 6: Descriptive Statistics of Trust Variables

Statements	Mean	Std.D
community is safe	3.28	.896
Government is well prepared for next destructive earthquake	2.85	.901
Average mean	**3.07**	**(61.4%)**

Table no. 6 shows the descriptive statistics of trust. Two statements designed in 5-point likert scale (1-5) were used in the table with their respective mean ranging from 2.85 to 3.28 and average mean is 3.07 which show that responses have positive inclination. The table shows that the first statement had highest mean statement of 3.28 which indicates people are have good trust in community and they feel their community safe due to factors like availability of open spaces and safer houses. People had comparatively lower trust regarding the government's preparedness for next disaster. Thus, from people opinion it can was seen that past experience can affect people's trust in authorities.

4.2.4 Attitude

Under this variable questions were designed to know people's attitude toward vulnerability of their house, perception of strength according to the building type, attitude toward earthquake resistant building construction, attitude toward building permit process and opinion about proper implementation of building code-bye-laws.

Table 7: Descriptive Statistics of Attitude variable

Statements	Mean	Std.D
Vulnerable of existing buildings	1.87	.999
Earthquake resistant buildings should be built	3.84	.765
Financial condition	3.26	.883
Satisfied with the building permit process	3.19	1.034
Average mean	**3.04 (60.8%)**	

Table 7 shows the descriptive statistics of attitude. Mean ranges from 1.87 to 3.84 and average mean of attitude variable was 3.04 out of 5 which show that responses have positive inclination. The table shows that the second statement has highest mean statement of 3.84 which indicate agreed earthquake resistant buildings should be built and third statement has lowest mean 1.87 which indicates that they feel their house less vulnerable and safe. Similarly people were moderately satisfied with building permit process due to several reasons like complex and lengthy process.Importance of attitude available was also discussed in other research [16].

4.3 Building information

Majority of the respondents (64%) considered poorly constructed load bearing or RCC structures as vulnerable. Majority of the buildings built were of RCC-C type (56%) followed by Brick masonry in cement mortar (29%). After 2072 earthquake, majority of building were designed by engineers (62%), 28% followed ready to use model provided by NRA design catalogue for earthquake resistant building.

4.4 Risk Perception Score

To obtain total risk perception score, average of mean score of four parameter was obtained i.e. score knowledge, experience, trust and attitude.Risk perception score was found to be 58.8% which suggest that there was fairly good better risk perception among people which can be significantly enhanced.

4.5 Correlation Analysis between Risk Perception Indicators

Correlation is a bi variate analysis which measures the strength of a relationship between two variables. A strong or high correlation means that two or more variables have strong relationship with each other, while a weak or low correlation means that the variables are hardly related.

Table 8: Correlation among RP score and indicators

Variables		RP score
Knowledge score	Pearson Correlation	.656**
	Sig. (2-tailed)	0
	N	250
Experience score	Pearson Correlation	.606**
	Sig. (2-tailed)	0
	N	250
Trust score	Pearson Correlation	.558**
	Sig. (2-tailed)	0
	N	250
Attitude score	Pearson Correlation	.524**
	Sig. (2-tailed)	0
	N	250

Knowledge, experience, trust and attitude had significant association with seismic risk perception and knowledge had the highest association.

4.6 Socio-demographic Variables and Seismic Risk Perception

Independent Sample T test and Anova test was used to compare means of Risk Perception (RP) score which was dependent variables among variables socio demographic variables (independent variables).

From Comparison of mean test(T-test and Anova test), it was found that there was significant differences in mean score of risk perception among Gender, age groups and ownership status. Seismic risk perception among male was seen higher than female which was the result of increased knowledge and positive attitude among male respondents. From anova table, it can been seen, age variable had significant difference in mean score of risk perception. 30-39 age groups had lowest risk perception. This was due to lower score of risk perception indicators i.e. knowledge, experience, trust and attitude in 30-39 age group. Most (66%) of

the respondents were female with lower risk perception.Similarly, Tenants had lower knowledge and experience on the subject matter and thus risk perception was higher in owner. Thus some of the socio-demographic variables had significant mean differences.

Table 9: Result of Independent sample T-test

Gender				
Categories	N	Mean score of RP	Std. D	Sig. (2-tailed)
Female	127	56.44	6.3	0
Male	123	61.2	7	
Vulnerable Family Members				
Yes	88	59.74	7.45	0.11
No	162	58.26	6.79	
Ownership Status				
Owner	235	59.25	6.86	0
Tenant	15	51.	6.08	

Table 10: Result of Anova Test

Variables	F	P value
Age	2.93	0.034
Education Level	0.506	0.731
Income level	1.808	0.128
Occupation	1.749	0.14

4.7 Relationship between risk perception and building code compliance

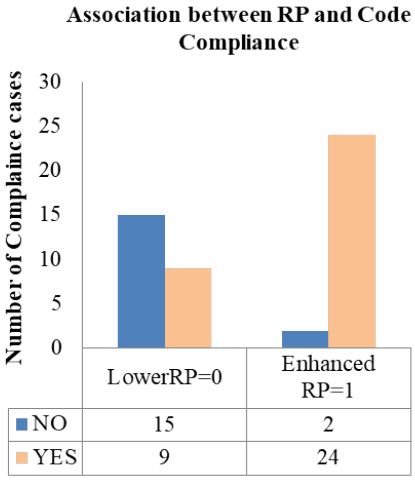

Figure 4: Association between RP and Code Compliance

Risk perception and code-compliance are two different variables. To check the significance between these two, first risk perceptions was categorized into two groups (higher than mean and lower than mean). Drawings (collected from municipal records) of 50 samples from survey data were collected and compared to check compliance with NBC. Chi Square test shows significant association among these groups.

Chi Square test shows significant association among enhanced risk perception and code compliance. Most of the people with higher risk perception had their house compliant to building code and vice versa.

Table 11: Chi Square Test

	Value	df	Asymptotic Sig. (2-sided)
Pearson Chi-Square	16.706[a]	1	0.00
Continuity Correction[b]	14.353	1	0.00
Likelihood Ratio	18.247	1	0.00
Fisher's Exact Test			
Linear-by-Linear Association	16.372[c]	1	0.00
N of Valid Cases	50		

	Value	Approx Sig.	Exact Sig.
Phi	0.58	0	0
Cramer's V	0.58	0	0
N of Valid cases	50		

4.8 Limitations of the study

The study had some limitations. This research was carried out among people of private residential housing. Risk perceptions have several dimensions; the indicator related to the safer building construction was mostly included.To check the compliance with building code, Mandatory rule of thumb (MRT) and guidelines for earthquake resistant buildings was used and only 20% of sample size was taken into consideration.

5. Conclusion and Recommendation

5.1 Conclusion

The study was carried out to examine the risk perception of people, factors affecting it and explore the significance between risk perception and safe code compliance. Questionnaire survey was carried among members of 250 households. According to the survey result it was found that people's perception of seismic risk was fairly good. The mean score of risk

perception was found to be 58.8% which can be significantly enhanced.

Among socio-demographic variables: gender, age and ownership status showed significant differences in mean score of risk perception. Male respondent showed better risk perception than female.Male respondents were more engaged in building permit process and construction supervision of their houses as a result they had better knowledge and positive attitude regarding the subject matter resulting in better seismic risk perception score than female. 30-39 age groups had lowest risk perception. Most of the respondents of 30-39 age group were female with lower risk perception who had lower score of risk perception indicators i.e. knowledge, experience, trust and attitude. Similarly, Tenants had lower knowledge and experience on the subject matter and thus risk perception was higher in owners.

Among risk perception indicators, all parameters i.e. knowledge (0.656), experience (0.606), trust (0.558) and attitude (0.524) had positive correlation with seismic risk perception. Knowledge showed highest correlation. In this study level of education did not had significant impact on risk perception rather Knowledge of related matter affected seismic risk perception. Importance of knowledge regarding hazard was also highlighted in similar studies [11, 13]. Experience of past earthquake affected risk perception this was also highlighted in previous study [17]. People who experienced greater damage showed better risk perception and greater aptitude for code-compliance. Greater trust in community and authorities resulted in better risk perception. This was also seen in previous literature [17, 13]. Attitude toward vulnerability of house, attitude toward building permit process, all had positive impact on seismic risk perception and significantly influenced code-compliance behaviour.

Most of the people were slightly familiar with the building code implementation and moderately satisfied with the building permit process. They tend to rely on engineers for safety of their house which is also found in other research [18]. Orientation and engineers advice was seen as the most effective source of information which could be used as method to convey the meaning of building code, importance of it and its implementation. In some cases, reasons like economic condition, land issues limit the compliance. Lack of knowledge and ignorance were also reason for non-compliance with building code.

Those people with code-bye-laws compliant houses were found to have greater mean score of risk perception. So, it can be seen that enhanced risk perception have positive influence in greater compliance to building code and bye-laws. Seismic risk perception is the combination of several factors [17, 13, 19]. Better Risk communication enhances risk perception and helps to understand the consequences of any hazard. Good knowledge on earthquake resistant design increases the chances of incorporating the ideas in new constructions. Since, most of the non-compliance cases were due lack of knowledge in related matter. Familiarity with building code and bye laws can help people to understand it and increased compliance rate. Level of damage experience in the past impacted one's perception and motivated to comply with code to secure the buildings. Similarly, likelihood of destructive earthquake in near future created fear among people and people tend to comply with code to make their building safe. Thus, Knowledge, experience of the past and increased trust in community and authorities were determinants of risk perception and significantly effect of code-compliance behaviour.

Seismic Risk perception is a long term process [20] which has potential role in disaster risk reduction. In case of code-compliance seismic risk perception has significant association also found in other research [16]. Enhanced seismic risk perception can help to achieve better implementation and compliance with safe building code.

5.2 Recommendation for future research

Risk perception has significant impact on decision making capacity. In this study influence of risk perception on safe building code-compliance was explored. Further studies can be done on this topic.

- In-depth study can be done by taking larger number of samples.
- Seismic risk perception can be studied in relation with other mitigation strategies like seismic retrofitting, risk insurance.
- Role of seismic risk perception can be explored in other phases of disaster risk management.

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