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Exploring the change of Risk Perception and Adaptation Behavior among Varied Social Character Before and After Earthquake Disaster – A Case Study in Taiwan

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Abstract. Resilience has rapidly arisen in multiple disciplines and has been regarded as the key in disaster mitigation and adaptation. Objective indicator framework is a common way evaluating resilience while limited attention on measuring subjective resilience. In fact, subjective resilience might further explain how people respond to the uncertainty of disaster risks. Due to the limitation on predicting potential earthquake events, past studies put more efforts on discussing pre-disaster. Luckily, this paper could explore the change of risk perception and adaptation behavior in types of socio-economic groups through a comparative analysis between pre- and post- earthquake disaster, and one-way analysis of variance with Post Hoc test is applied to examining the change of risk perception and adaptation behavior. The results show that female might be much willing on house retrofit due to the fear and the worrisome. However, the elders might be less aware on earthquake than the young. Education indeed affects people's risk perception and adaptive behavior. As a whole, the results could be referred to areas clustered of male, female, elder population, and lower education population by providing risk communication, risk education, and diverse disaster adaptation options. Although limitation exists, the results of comparative analysis between pre-disaster and post-disaster conditions could be referred to adequate strategies and decide the priority of risk management policies by governments.

1 Introduction

The Ring of Fire in East Asia has been regarded as the most frequently hit by earthquake disasters for high rate of world's earthquakes occurred previously (USGS 2017). The call for disaster prevention and risk reduction has been discussed since the declaration of the International Decade for Natural Disaster Reduction 1999 (UNISDR 1999). In order to mitigate dramatic loss, governments have invested a great amount of public resources to finance disaster management, and in particular, structural engineering measures are the major approaches to cope with earthquake events. However, risk of property damage and loss of life is possible wherever development is allowed in potential seismic areas for the occurrence of disaster is at or below the design standard incorporated in the building codes and structural works areas (Kerr et al. 2003; Petak and Atkisson 1982; Sheaffer and Roland 1976). The drawback of common reliance on structural engineering measurements results in a new

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research mark on mediation the exposure to risk by selecting suitable adjustments. Lately, the Sendai Framework for Disaster Risk Reduction 2015-2030 has committed that the main priorities on disaster mitigation and adaptation are minimizing disaster risk and building resilience (UNISDR, 2019).

Subjective resilience indicates that individuals' cognitive might affect self-evaluation of the capabilities, capacities and limits in responding to risk (Jones and Tanner 2017). The increasing studies have put emphases on measuring subjective elements at the individual and household (Brown and Westaway 2011; Adger et al. 2009). The assessment of subjective resilience is able to offer a more comprehensive understanding of how people be aware of their own capabilities and capacities while facing serious environmental change and disturbances (Nguyen and James 2013; Marshall 2010). The significant discrepancies between subjective and objective measures might also include income, age, gender and such inequalities make some people more prone to disaster than others (Bankoff 2006; Wisner et al. 2004). Based upon the definition of subjective resilience, this paper focuses on exploring risk perception and adaptation. Disaster risk appears to mean different things to different people and it will change according to growth background, knowledge system, and disaster experiences (Belk 1975; Downs 1970). The perceived risk does not necessarily equal to the occurrence probability of the disaster, but instead it sums up many other factors including external and internal factors (Sjöberg 2000; Sjöberg 1996; Eagly and Chaiken 1993). The external factors might include the social status, living environment, disaster types, while the internal factors might include attitude, cognition, and degree of danger comprehension. Due to limited knowledge and resource, people tend not to respond to common disaster; tend to have personal preference on disaster such as denying disaster, denying disaster probability, belief on government and public infrastructure etc. Therefore, adaptation behavior is generally limited by perception and prior knowledge (White et al. 2001; Tobin and Montz 1997).

To sum up, threats posed in a given area by future earthquakes with a magnitude larger than that experienced in the past creates uncertainty in the ability to mitigate impacts to acceptable levels using only engineering or construction measures. Humans have capability to respond the environment to reduce risk by learning from past experience, and the changes of attitude and behavior have great help to respond earthquake disaster. Theoretically, a more accurate measurement and tracking of the interactions of social norms, behavior and institutions that collectively affects responses to disasters might help to support the right activities and target the right people in disaster management (Oddsdottir et al. 2013; Adger 2000). Past study put more efforts in pre-disaster to explore the interactions of individual's decisions (Levine 2014). The examination of pre-disaster and post-disaster could reveal the impact of extreme events and how people might change on perceiving such disaster and willingness of adopting potential adaptation approaches. As a whole, this study bases on past studies and contributes to the exploration of how earthquake disasters influence the risk perception and adaptation behavior of residents and further categorizes according to the social characteristics. The sample is of particular interest for it contains pre- and post-disaster information on residents who directly affected by Meinong Earthquake (participants completed surveys approximately 1 year before and 3 months after the earthquake), permitting a more robust of the effect of natural disaster on subjective resilience than previous research.

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In addition to introduction, the paper is organized as follows. Section 2 provides a brief description of the research design including the study area, the data collection, the measures on subjective resilience, and the methods. Section 3 presents the comparative analysis between pre- and post-disaster survey based upon one-way analysis variance results. Section 4 presents the comparative analysis between our findings and past studies. The final section offers some conclusion.

2 Data and Methodology

2.1 Study area

The study area of Taiwan is located along the Philippine Sea Plate and the Eurasia continental plate, and orogenic belt of central-southern Taiwan has been undergone intensive crustal deformation. It is exposed to earthquake events, as most active faults were confirmed after the city had already been built upon them. An active fault called the Houchiali Fault trends north to south across the study area (Lin et al., 2000; Chen and Liu, 2000). In addition, the soft soil might amplify surface ground motion, Meinong Earthquake, a local magnitude 6.6 earthquake in 2015 has stroke southern Taiwan devastatingly, resulting 117 deaths and numerous buildings reportedly collapsed (National Applied Research Laboratories 2018; Tsai et al. 2017). In the study area Yongkang, 744 buildings are reported damaged, and in particular a building fully collapsed resulted in 115 deaths (see Fig. 1a). According to the Central Weather Bureau (Huang et al. 2009), a large magnitude earthquake occurs once every thirty years in southern Taiwan. In fact, the study area is exposed to earthquake disasters, as most active faults were confirmed after the city had already been built upon them, and an active fault called the Houchiali Fault trends north to south across the study area. Although the existing Houchiali Fault has been identified as Late Pleistocene active fault lately, the intensified and dense built environment has been developed right on and close to the fault line (see Fig. 1b). In addition, there is an increasing population growth in the study area, and in particular some areas along the fault line are relative dense population clustered (see Fig. 1c, 1d).

2.2 Data collection

There are thirty-nine townships within study area. A total of 429 individuals completed the pre-disaster survey, which was conducted between October and December of 2014. The post-earthquake follow-up survey conducted in May of 2016 (3 months after Meinong Earthquake), and trained interviewers conducted the survey over the phone, asking the same questions as in the pre-disaster survey. All survey sampling methods relied on simple random sampling. The respondents were reminded of some notifications, and the scale of earthquake magnitude is defined as an over 6.0. The content of surveys questions contained five parts, such as behavioural intention to adopt residential seismic strengthening, risk perception, sensitive to earthquakes, trust in government and responsibility attribution. All parts have three questionnaires at least.

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The main goal of our study is to explore trajectory of risk perception and adaptation behavior before and after the earthquake. The same questionnaire allows us to examine the question with the same earthquake risk area 1 year before and 3 months after the disaster.

2.3 Measures on risk perception and adaptation behaviour

An increasing research focus on risk perception of earthquake disaster and such perception might be varied (Lindell and Perry 2004). The perception of disaster risk does not represent a direct function of the probability that the threatening events will occur; rather, risk perception captures many other factors such as attitude, cognition, degree of danger comprehension, and vulnerability (Sjöberg 2000; Sjöberg 1996; Eagly and Chaiken 1993). Previous studies have shown that terror often accompanies changes in the physical environment, the loss of human lives and the destruction of property (Palm and Carrol 1998; Reid 1995; Kennedy 1994). Therefore, in the earthquake related stressors, we were concerned with individuals' perceptions of the probability of an earthquake disaster occurring within ten years and the impacts they expected from the disaster including the fear of earthquake and the worry of building collapsed.

Individuals form their self-disaster-perceptions according to exterior factors, such as prior disaster experiences and observation of the natural environment, and interior factors such as education and faith (Berkes and Folke 2002; Berkes 1999). Adjustment behavior is a way for the individual to adapt his or her living environment to new events that may occur and impact the existing system (Gifford 2014). People who are fatalism have lower willingness to adopt any mitigation measures for external factors cause disasters (Alexander 1999; Lehman and Taylor 1987). However, people who are internal control might adopt any mitigation measures to respond disaster (McClure et al. 1999). Therefore, in the adaptation behavior section, we were concerned with the ways in which people respond to earthquake disasters. There are two questions within house retrofit including the willingness on house retrofit and house retrofit after professional assessment.

2.4 Methods: one-way analysis of variance

Analysis of variance (ANOVA) is notable for Cohen (1988), Odeh and Fox (1991), Murphy and Myors (2004), and it has received extended attention in interdisciplinary research. One-way analysis of variance is an extension of the independent samples t-test which can be used to compare any number of groups (Bewick et al. 2004; Whitely and Ball 2002). The core value of one-way analysis of variance is to examine means are statistically significantly different from each other between groups. One-way analysis of variance is calculated by:

$$\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1} \quad (1)$$

Where the variance came from a set of n values $(x_1, x_2, \ldots, x_n)$, the degrees of freedom is n-1.

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Within one-way analysis of variance, the F statistic test is used and represented equal among groups. A significant F statistic test on behalf of a significant difference between groups, and the P-value, less than 0.05, is the common threshold. First of all, the Levene's Test is applied to examine the null hypothesis that the variance is equal across groups. The result of Levene's Test less than 0.05 indicates that it is necessary to apply Welch's Test for there is no equal variances between groups. On the other hand, if the result of Levene's Test is greater than 0.05, then we can depend on the result of ANOVA. Overall, a significant F statistic in both Welch's Test and ANOVA indicates that at least two of groups are different but not identify which groups are different from the others. However, P-value less than 0.05 is the significance level or the probability of a type error which is the chance of incorrectly rejecting the null hypothesis or wrongly concluding a difference between groups. Therefore, post hoc test, multiple comparison analysis testing, is necessary to be applied to avoid type error and further examine the differences between levels. Due to the assumption of homogeneity of variance, we will then apply Games-Howell Test and Benjamini-Hochberg Procedure respectively (see Fig. 2).

Quantitative data analysis was conducted using the Statistical Package for Social Scientists (SPSS) software. Each response to the questions in the questionnaire survey was rated on a scale of 1 to 7, with 1 as the highest vulnerability (or lowest resilience) to 7 as the lowest vulnerability (highest resilience).

3 Results

The number of respondents were similar for each sex and male is a little more than female in pre-earthquake survey while female is a little more than male in post-earthquake survey. Regarding age, most respondents in pre- and post- earthquake survey were between 16-60 years old and thus had the knowledge and capability to develop their self-perceptions and adjustment behavior. Regarding occupation and education, the majority of respondents were graduated from high school and blue-collar, comparing to interviewees were bachelor/master or white collar, they might have less capability on adjustment behavior. In Taiwanese culture, owning one's house is preferred over renting. Indeed, the survey shows that less than 20% of the respondents rent their homes (see Table 1).

3.1 Sex

In the sex category, the statistical significance (the P value of 0.008) exits only in worry of building collapsed in both pre- and post-earthquake survey indicating that residents are indeed worrying building collapsed, and female might be much worry than male after a serious earthquake. In the post-earthquake survey, the earthquake probability (the P value of 0.049), the fear of earthquake (the P value of 0.000), and the willingness on house retrofit (the P value of 0.002) are statistical significance indicating a serious earthquake indeed increase awareness of disaster (see Figure 3). However, Meinong Earthquake seems decrease willingness on house retrofit. The value of willingness on house retrofit is lower than the worry of building collapsed, and the female has the relative low than the male. As a whole, the earthquake event indeed affects individual awareness

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especially there is a relative higher increment in female. However, the adaptation behaviour is necessary increase with the individual awareness.

3.2 Age

In pre-disaster survey, different kinds of age groups show similar awareness and willingness on house retrofit; in the other hand, in post-disaster survey, the P value of 0.045 in the willingness on house retrofit indicates that at least two of the age groups are different. However, Hochberg Test result P value of 0.113 indicates no statistical significant difference between groups in age (see Fig. 4). Although the P-value is not significant in most group, the willingness on house retrofit decrease after Meinong Earthquake. And the willingness on house retrofit is much lower than house retrofit after professional assessment. There is a sharp increment in earthquake probability and the fear of earthquake while only small increment regarding the worry of building collapsed. In addition, elder people seems have less awareness of disaster and willingness on house retrofit than other age groups.

3.3 Education

In pre-disaster survey, different kinds of education groups show similar awareness and willingness on earthquake probability and house retrofit; in the contrary, in post-disaster survey, the P value of 0.001 in earthquake probability, the P value of 0.046 in the worry of building collapsed, and the P value of 0.005 in house retrofit after professional assessment indicate that at least two groups in education have statistical significantly differences (see Fig. 5). Generally, the P value become significant in earthquake probability, the worry of building collapsed, and house retrofit after professional assessment. The willingness decreases in both questions regarding house retrofit. Higher education group show relative higher willingness on house retrofit than any other groups. In addition, higher education shows relative higher awareness on disaster but less worry of building collapsed. This paper further applies post hoc to compare the different awareness and willingness on earthquake probability, the worry of building collapsed, and house retrofit. The results show that different education groups indeed have different awareness and preferences on earthquake probability and house retrofit. Generally, higher education has relative higher awareness of earthquake and willingness on house retrofit (see Table 2).

3.4 Occupation

The P value of 0.004 in the fear of earthquake and the P value of 0.005 in the worry of building collapsed in pre-disaster survey, and all the P values in post-disaster survey indicate that at least two groups in occupation have statistical significantly differences. The similar trend happens in occupation: the willingness of house retrofit decrease after Meinong Earthquake, and individual have relative higher willingness after professional assessment. As a whole, white collar have relative higher awareness of disaster and relative higher willingness on house retrofit than any other groups (see Fig. 6). This paper further applies post hoc to examine how different between groups regarding awareness and preference. Regarding the fear of earthquake, home manager shows relative higher awareness than students, blue collar or even white collar. As for the worry

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of building collapsed, home manager still shows higher awareness than other occupation groups. In post-disaster survey, no matter self-willingness or professional assessment, white-collar shows relative higher preference on house retrofit than blue-collar (see Table 3).

3.5 House ownership

In pre-disaster survey, different kinds of house ownership groups show similar awareness and willingness on earthquake probability and house retrofit. However, in post-disaster survey, the P value of 0.009 in the willingness on house retrofit indicate that at least two groups in house ownership have statistical significantly different preferences (see Fig. 7). This paper further applies post hoc examine the different preference on house retrofit. The results show that family owned group would have relative higher willingness on house retrofit than self-owned group (see Table 4).

4 Discussions

In the study, we found that although female has greater fear and worry in the coming earthquake disaster than male, male has more willingness on house retrofit. According to the past studies, the response of women might be more inside and backstage, men's is more outside and front stage (Enarson 2001; Always et al. 1998; Fordham 1998). The economic status and family role of women might forbid possible adaptive choices comparing to men (Tobin-Gurley and Enarson 2013). Men, in the other hand, are more risk tolerant than women (Finucane et al. 2000). Although gender inequality prevails in different ways around the world, the safety concern for the family among women has been well documented in both environmental protection movements and neighborhood emergency-preparedness campaigns (Litt et al. 2012; Luft 2008; Erikson 1994; Turner et al. 1986). Therefore, it is necessary to provide more diverse options of house retrofit for families in particular the yellow and red districts while increase risk awareness in the others (see Figure 8).

According to the results, elder people seems have less awareness of disaster and willingness on house retrofit than other age groups. Age affects cognitive, physical mobility, and disaster adaptive behaviors in many ways. A typical definition of an elderly person is 65 years old or older. Elder people might receive higher disaster impacts for the increasing health concerns, reduced mobility, and fixed economic resources. The past disaster record shows that 67% of mortal population (over 1,300 persons) in Hurricane Katrina were elder people while elder group represented only 12% of the pre-storm (Sharkey 2007). The similar condition happened in 1995 Chicago heat, 2003 European heat, 1995 Kobe earthquake, 2011 Tohoku earthquake (Associated Press 2011; Hewitt 2007; Larse 2006; Klinenberg 2002). Some studies revealed that elder people are less likely to receive warnings for diminished social network, less information-seeking behavior, limited physical capabilities (Lindell and Perry 2000). Or the elder people might not comply such risk warning for limited mobility, physical infirmity, and inflexibility (Turner 1976; Friedsam 1962). According to the distribution map of the elder population (see Figure 9), the southern portion might be the clustered spot for the elder population. Therefore, it is not only to put more emergent resources during disaster but help be prepared in advance in such areas.

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Last but not least, higher education shows relative higher awareness on disaster but less worry of building collapsed, and higher education group show relative higher willingness on house retrofit than any other groups. Home manager shows relative higher awareness than students, blue collar or even white collar in pre-disaster survey. However, regarding the willingness on house retrofit, white collar shows relative higher willingness. The available resource might be the key factor affect people preparing for and responding to the disaster. Social stratification plays a role in perceiving and reacting to risk including the understanding of disaster information, whom announce disaster information, and potential options to respond (Fothergill and Peek 2004). Past studies have achieved sort of agreement on the poor might have relatively serious impacts during disaster and might have limited resources to cope with future disaster (Elliot and Pais 2006; Dash et al. 1997; Beatley 1989). Therefore, in the northern and eastern portion (see Figure 10), population with relative lower education is clustered in such areas, and risk education, risk training, and diverse house retrofit options might be required.

Sex, age, and class along does not make people vulnerable, while the interaction between each factors might result in the increment of vulnerability. Due to limited knowledge and resource, people tend not to response to common disaster; tend to have personal preference on disaster such as denying disaster, denying disaster probability, belief on government and public infrastructure etc (Gifford 2014). As a whole, social characteristic indeed affects the decision on disaster awareness and adaptive behaviors. In addition, the bounded rationality might further limit ultimate decision making. People who are fatalism might not adopt any mitigation measures for they believe they cannot prepare for an earthquake (Alexander 1999; Lehman and Taylor 1987; Turner 1986). However, people who are internal control might positively take any measures to respond disaster (McClure et al. 1999). Unrealistic comparative optimism refers to the common tendency for people to think they are less at risk of threats, such as illness, injury, or disaster, than are their peers (Dunning et al. 2004; Weinstein 1980).

In this study, male and elder population might be unrealistic comparative optimism in risk awareness. Therefore, both the male and the elder might become the target population of risk communication. Besides, female and lower education population might be limited to the resources on disaster mitigation and diverse approaches might be necessary to reduce potential impacts. As a whole, the disaster event might bring more attention from residents to be awareness and be prepared. However, with time goes by, both risk awareness and willingness on disaster mitigation might ne faded away. Therefore, risk communication, risk education, and diverse mitigation options are required as soon as possible after serious earthquake to help people be ready for the coming events.

5 Conclusions

A comparative analysis between pre-disaster and post-disaster conditions contributes to the significant and meaningful results in this study. The results show that female might be much willing on house retrofit due to the fear and the worrisome. The elders might ignore the probability of disaster events and have less willingness on house retrofit. Knowledge base might have significant impacts on both disaster awareness and house retrofit and higher knowledge people might have higher awareness but less worry on disaster events. As a result, the interaction between various social characteristics might result in the increment of vulnerability to the disasters. The study has the following limitations including the results might not be apply

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to any other disaster events but only earthquake. In addition, due to time limitation, the interviewees in pre- and post- survey are different. Still, the results could provide the general information regarding the change of risk perception and adaptation behavior between pre- and post- disaster event and the variation between different social characteristics. The findings could be referred to conduct risk communication strategies and decide the priority of risk management policies by governments.

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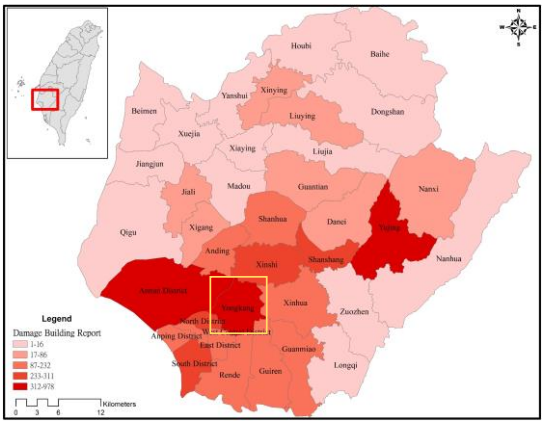
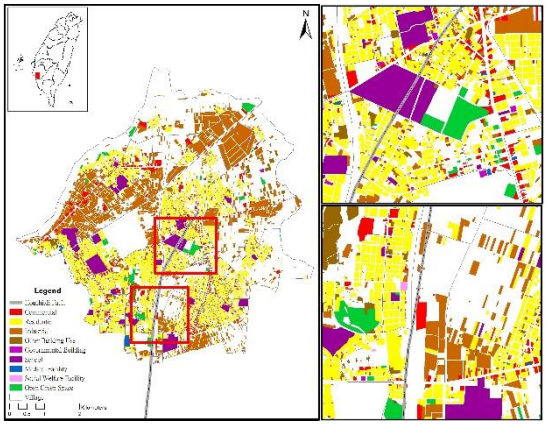


(a) Damage building in Meinong Earthquake in Tainan City



(b) 2015 land use in the study area

Data source: National Land Surveying and Mapping Center, Taiwan

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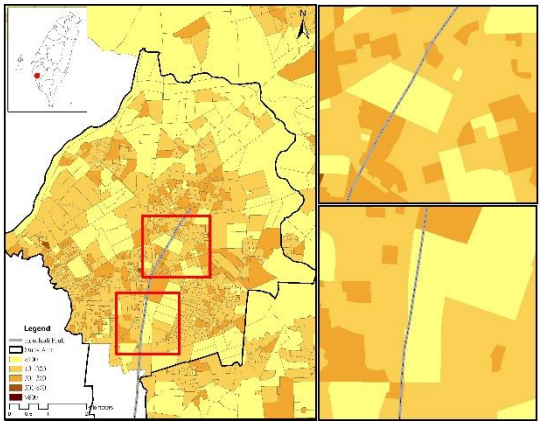
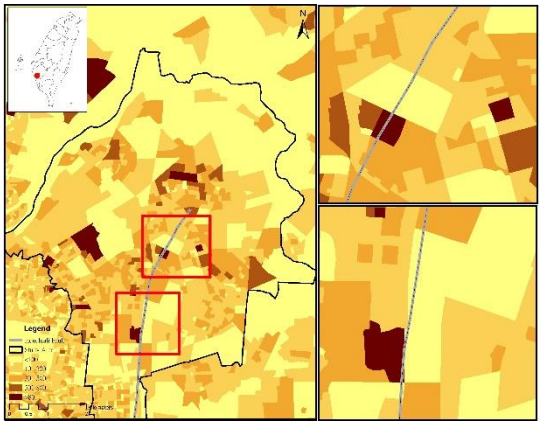


(c) 2009 population

Data source: Ministry of the Interior, Taiwan



(d) 2016 population

Data source: Ministry of the Interior, Taiwan

Fig. 1. Study area

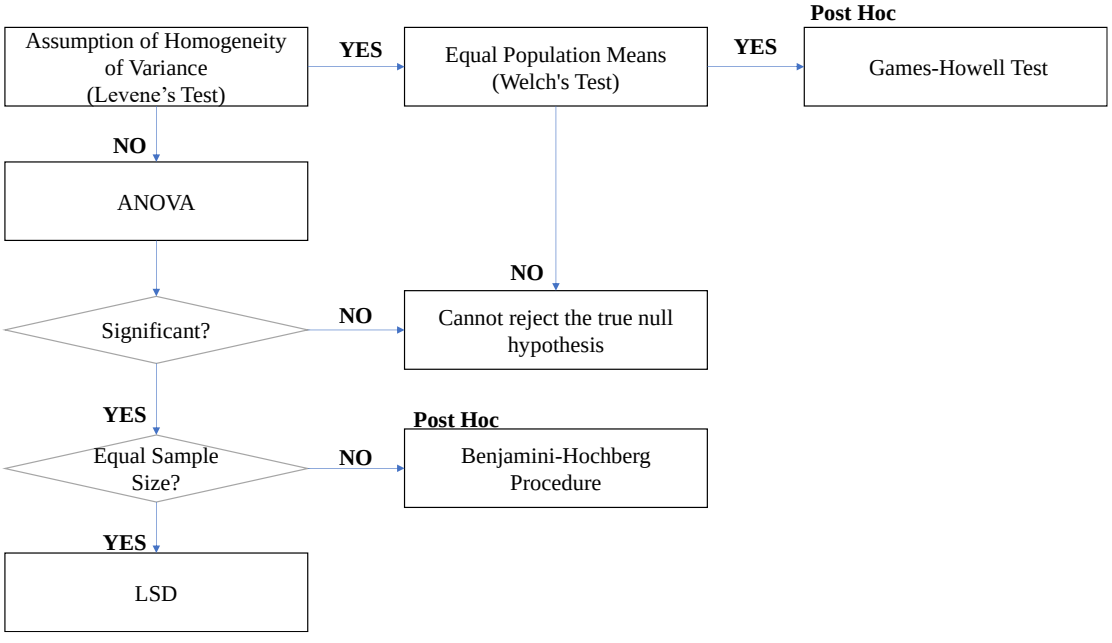


Fig. 2. Overall process of one-way analysis of variance

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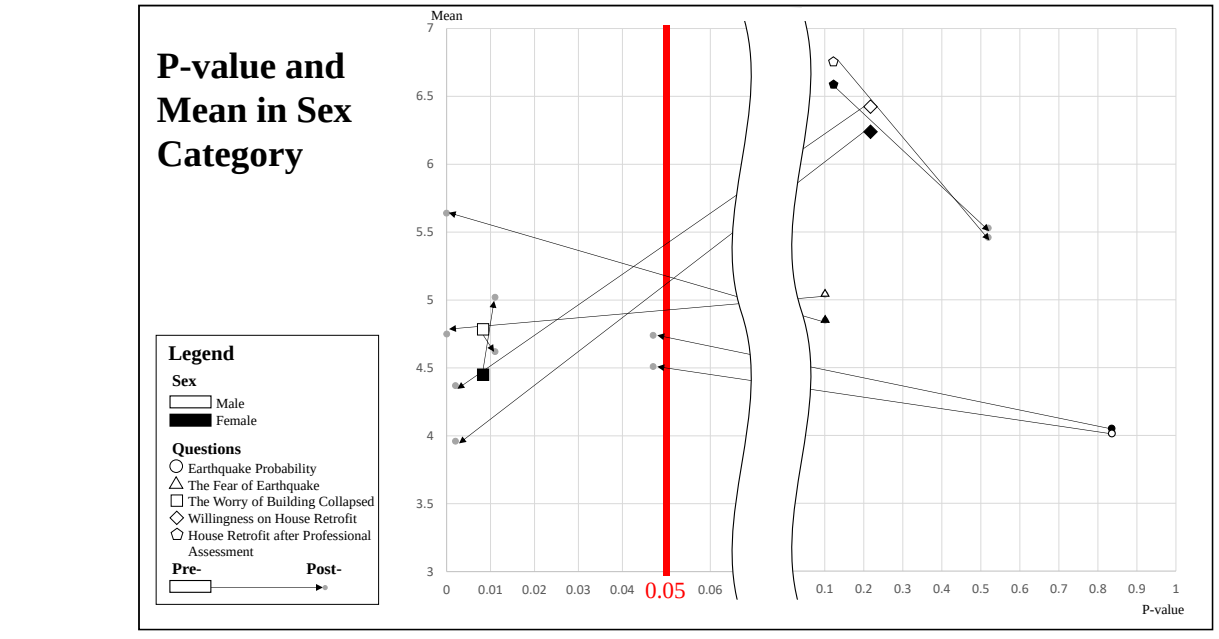

Fig. 3. P-value and mean in sex category

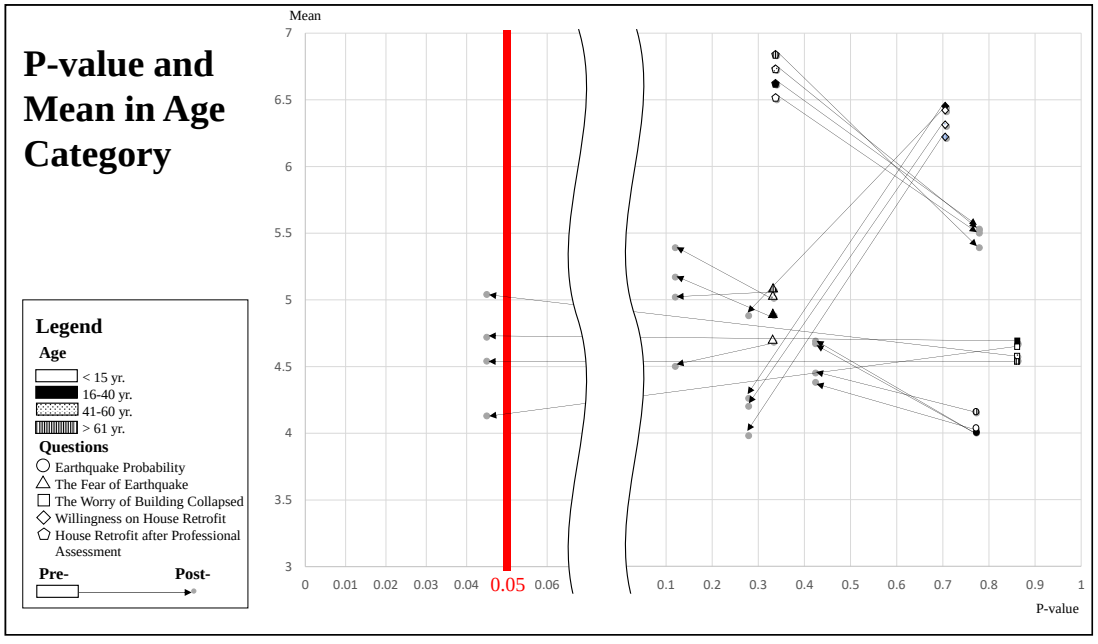

Fig. 4. P-value and mean in age category

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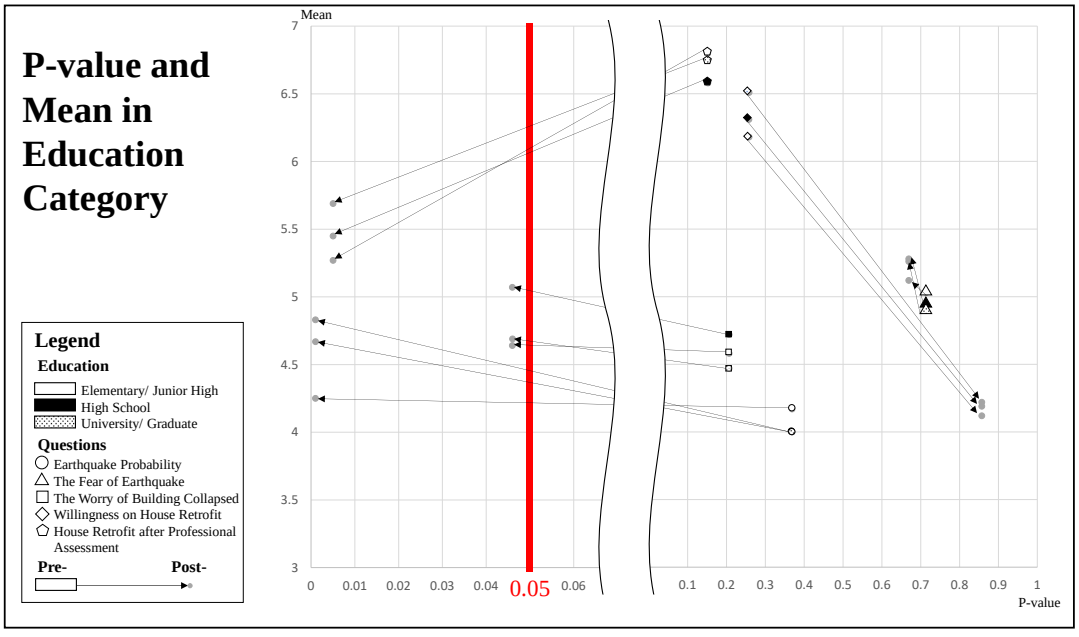

Fig. 5. P-value and mean in education category

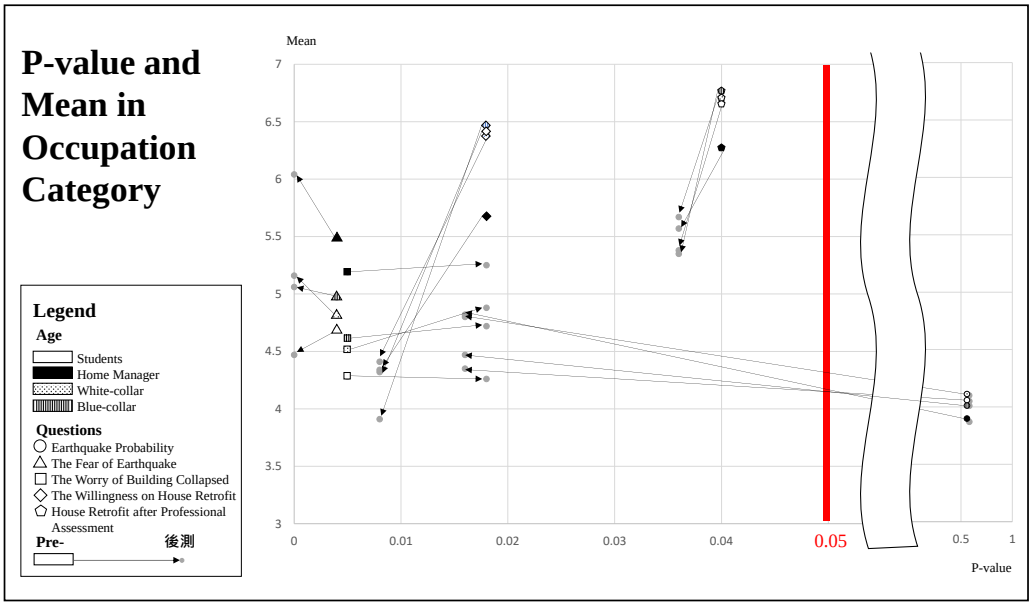

Fig. 6. P-value and mean in occupation category

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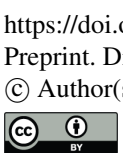

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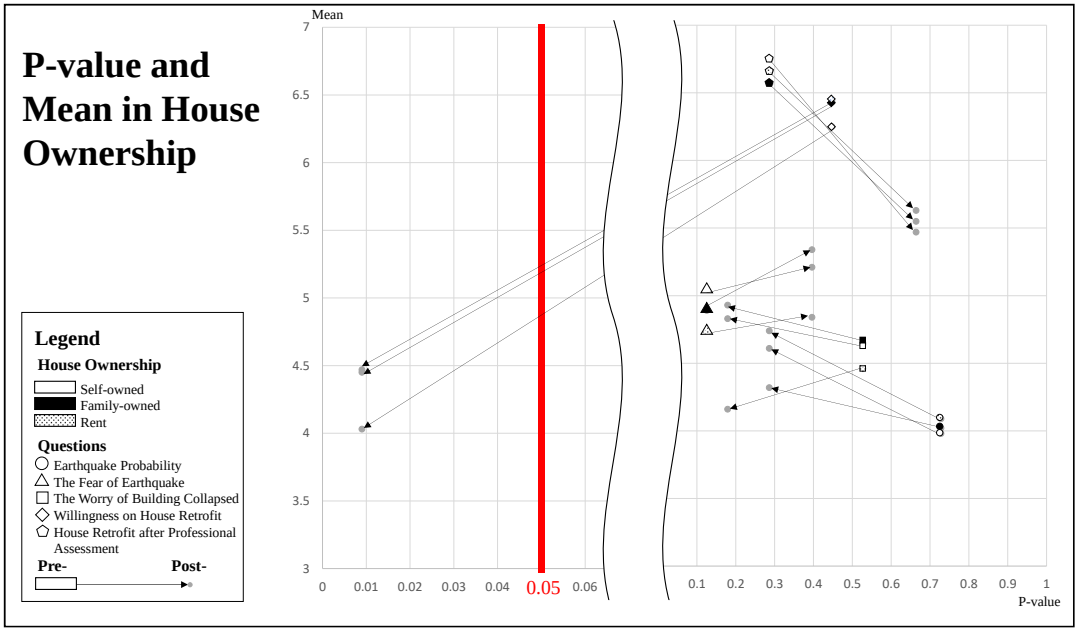

Fig. 7. P-value and mean in house ownership category

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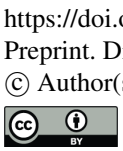

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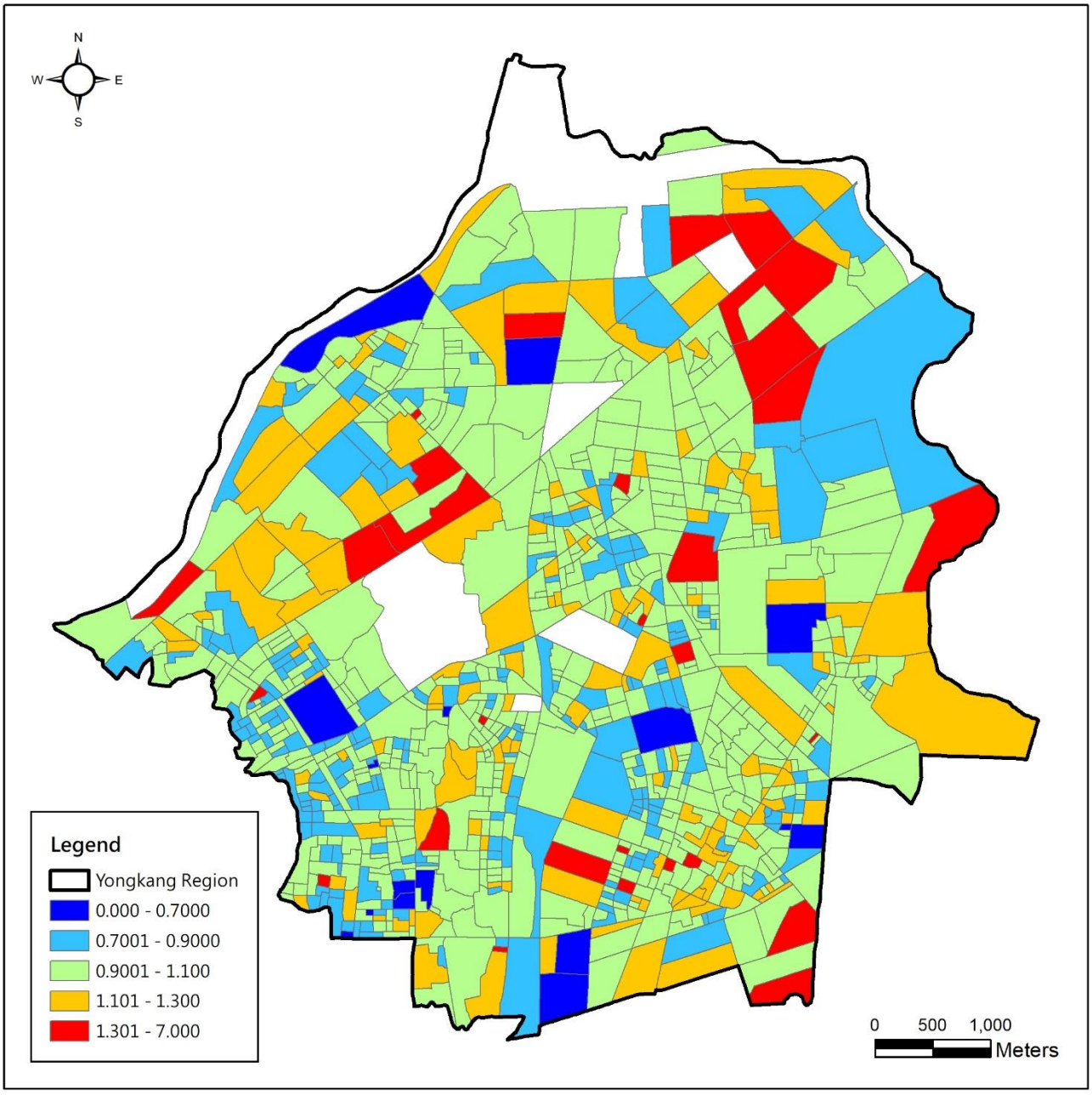

Fig. 8. Sex ration map

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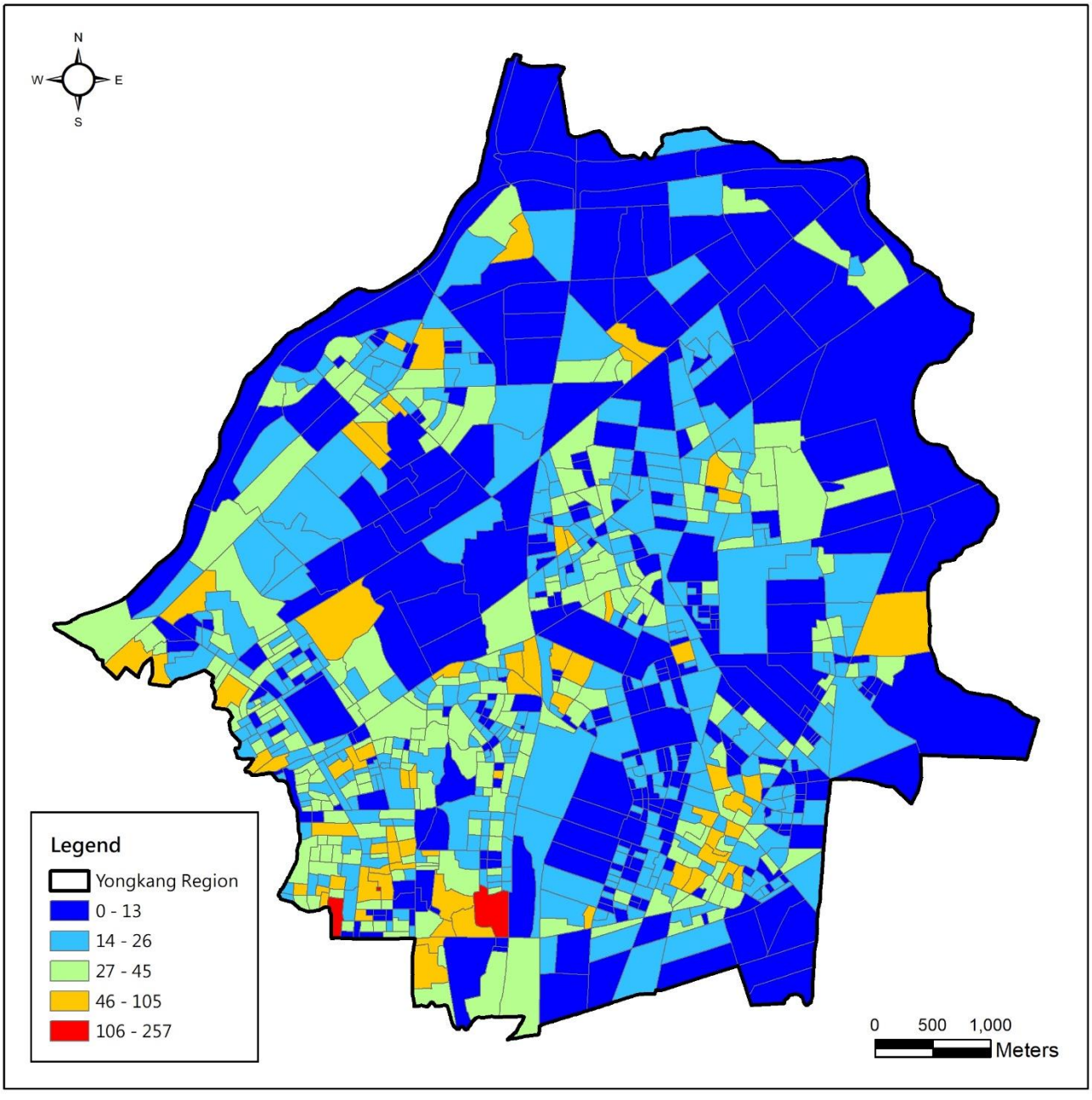

Fig. 9. Distribution map of the elder population

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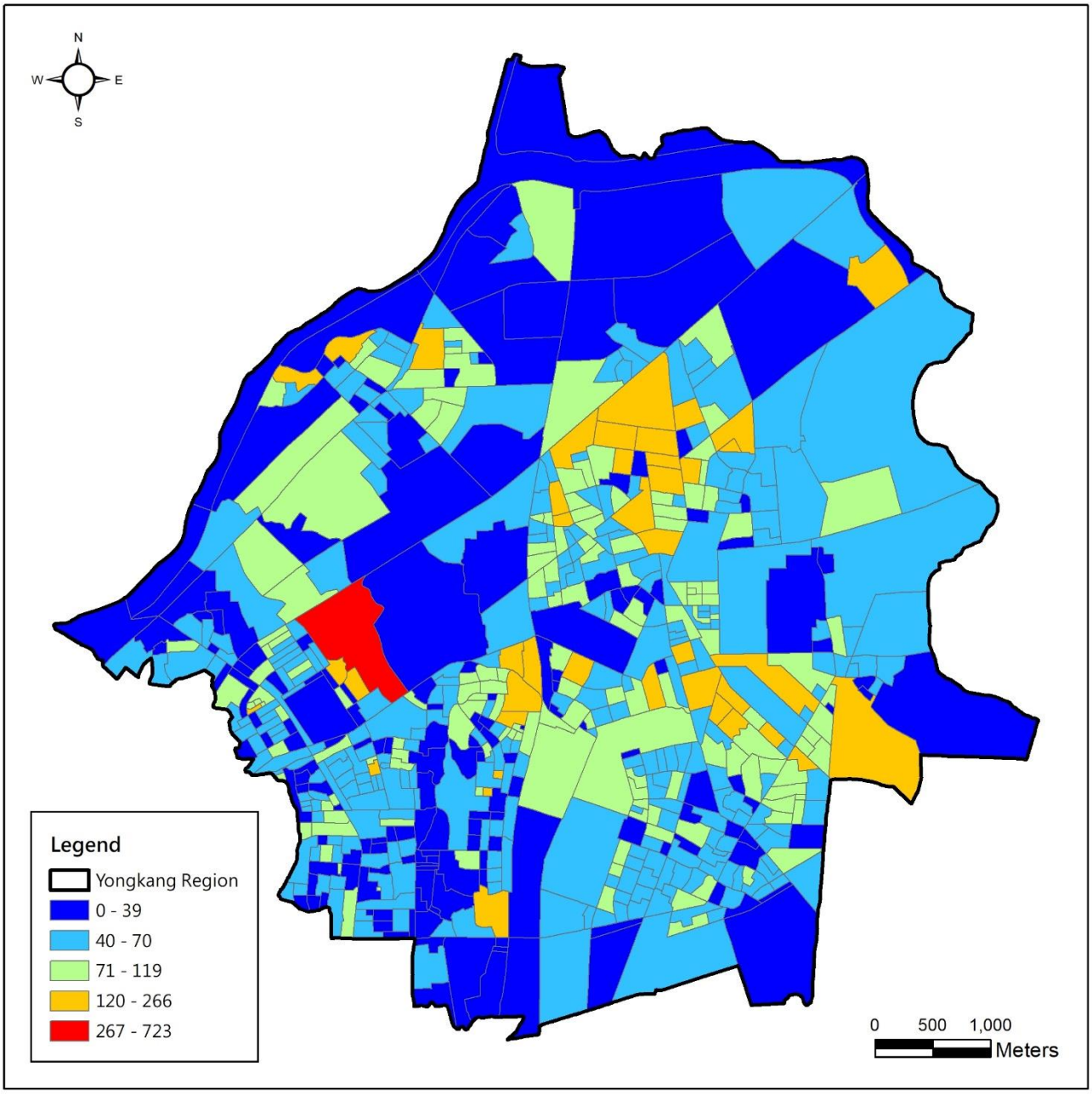

Fig. 10. Distribution map of high school graduation

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415 **Table 1** Sample characteristics in both pre- and post- earthquake survey.

Characteristics	Pre-	Post-	Characteristics	Pre-	Post-
Sex			**Occupation**		
Male	53.38%	44.89%	Students	9.09%	7.23%
Female	46.42%	55.11%	Home Manager	10.96%	18.94%
Age			White-collar	37.76%	32.55%
< 15 yr.	7.46%	1.70%	Blue-collar	41.96%	41.28%
16-40 yr.	38.23%	28.30%	**House Ownership**		
40-60 yr.	37.53%	51.91%	Self-owned	48.95%	63.62%
> 60 yr.	16.78%	18.09%	Family-owned	32.17%	32.34%
Education			Rent	18.65%	4.04%
Elementary/Junior High	21.68%	21.91%			
High School	47.32%	41.49%			
University/Graduate	31.00%	36.60%			

Table 2 Post hoc result for education.

Questions	Education	Education	Mean Difference	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Earthquake Probability (Post-earthquake) Hochberg Test	**Elementary/Junior High**	**High School**	**-0.414**	**0.148**	0.015*	-0.77	-0.06
	Elementary/Junior High	University/Graduate	-0.579	0.151	0.000***	-0.94	-0.22
House Retrofit after Professional Assessment (Post-earthquake) Hochberg Test	Elementary/Junior High	University/Graduate	-0.420	0.133	0.005**	-0.74	-0.10

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* $p < 0.05$； ** $p < 0.01$； ***$p < 0.001$.

420 **Table 3** Post hoc result for occupation

Questions	Education	Occupation	Mean Difference	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
The Fear of Earthquake (Pre-earthquake) Hochberg Test	**Students**	**Home Manager**	**-0.797**	**0.263**	0.015*	-1.49	-0.10
	Home Manager	White-collar	0.681	0.201	0.005**	0.15	1.21
The Worry of Building Collapsed (Pre-earthquake) Hochberg Test	Students	Home Manager	-0.909	0.277	0.007**	-1.64	-0.18
	Home Manager	White-collar	0.667	0.212	0.010*	0.11	1.23
	Home Manager	Blue-collar	0.586	0.209	0.032*	0.03	1.14
The Fear of Earthquake (Post-earthquake) Games-Howell Test	Students	Home Manager	-1.574	0.253	0.000***	-2.24	-0.90
	Students	White-collar	-0.693	0.254	0.041*	-1.37	-0.02
	Home Manager	White-collar	0.882	0.177	0.000***	0.42	1.34
	Home Manager	Blue-collar	0.983	0.171	0.000***	0.54	1,43
The Worry of Building Collapsed (Post-earthquake) Games-Howell Test	Students	Home Manager	-0.982	0.285	0.005**	-1.73	-0.24
The Willingness on House Retrofit (Post-earthquake) Hochberg Test	White-collar	Blue-collar	0.499	0.156	0.009**	0.09	0.91
House Retrofit after Professional Assessment (Post-earthquake) Hochberg Test	White-collar	Blue-collar	0.323	0.115	0.027*	0.03	0.62

* $p < 0.05$； ** $p < 0.01$； ***$p < 0.001$.

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430 **Table 4** Post hoc result for house ownership.

Questions	Education	House Ownership	Mean Difference	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Willingness on House Retrofit (Post-earthquake) Hochberg Test	**Self-owned**	**Family-owned**	**-0.424**	**0.144**	0.014*	-0.78	-0.07
	Family-owned	Self-owned	0.424	0.144	0.014*	0.07	0.78

* $p < 0.05$; ** $p < 0.01$; ***$p < 0.001$.