ORIGINAL RESEARCH

Health-Related Quality of Life and the Adaptation of Residents to Harsh Post-Earthquake Conditions in China

Ying Liang, PhD; Peiyi Lu

ABSTRACT

Objective: This study assessed the health-related quality of life (HRQOL) and the adaptation to harsh conditions (APHC) of residents living in post-earthquake zones in Sichuan Province, China, as well as the effect of HRQOL on APHC.

Methods: A sample survey was conducted in 5 counties in Sichuan in May and June 2013 (N = 2000). The 12-item Short Form Health Survey (SF-12) was used to measure HRQOL. The APHC scale was self-developed and was based on real-life conditions in China. Confirmatory factor analysis and structural equation model were used to analyze how HRQOL affected APHC.

Results: Cronbach α coefficients indicated that the internal reliability of both scales were good. Results showed that the physical component summary significantly affected APHC, while the effect of the mental component summary was insignificant. APHC had the greatest effect on the adaptation to poor infrastructures ($r = 0.721$) and the least effect on the adaptation to poor social security systems ($r = 0.608$).

Conclusions: The HRQOL of residents living in post-earthquake zones positively affected APHC, particularly physical health. These findings suggested the need for governmental improvement of infrastructures in post-disaster areas. (*Disaster Med Public Health Preparedness*. 2014;8:390-396)

Key Words: public policy, health policy, earthquakes, policy making, government

Sichuan Province, known as the Land of Abundance, is located in southwest China. The Yangtze River and its tributaries flow through the mountains of Western Sichuan and the Sichuan Basin. Unfortunately, people who live in Sichuan endure a great deal of suffering because of earthquakes. An earthquake with a magnitude of 8.0 on the Richter scale occurred in Wenchuan County on May 12, 2008. This earthquake was the most catastrophic since the founding of new China. Nearly 70 000 people died during this disaster, and millions of families lost their homes. On April 20, 2013, a magnitude 7.0 earthquake occurred in Lushan County, affecting more than 2 million people. These frequent earthquakes affected the communities and lives of people in Sichuan.

Health-related quality of life (HRQOL) is related to self-reported chronic diseases (eg, diabetes and cancer) and their risk factors (eg, social support and mental disorders). HRQOL measurements can help determine the burden of preventable diseases, injuries, and disabilities, and, in turn, provide valuable insights into the relationships between HRQOL and risk factors. Obtaining HRQOL measurements also aids in monitoring the progress in achieving national health objectives.[1] Shortly after the Wenchuan earthquake, many researchers became concerned with certain vulnerable groups.[2,3] In 2013, another 5 years later, Lushan experienced an earthquake. However, few studies have been conducted to assess the general HRQOL of residents living in post-earthquake zones.

To adapt refers to making changes or adjustments to fit or survive in a given environment. Adaptation denotes the process of adjusting to changed conditions. In the field of natural disasters, this concept has been applied to policy responses,[4] particularly for climate change.[5] The definition of adaptation involves the multifaceted characteristics of systems, including ecological, economic, social, and political aspects. Studying the adaptation of survivors under post-disaster conditions may help accelerate recovery and serve as a guide to prepare for future disasters.[6] However, most adaptation or vulnerability studies have focused more on climate change than on other types of natural hazards. Thus, limited information is available on the adaptation of residents living in post-earthquake zones.

 DOI: 10.1017/dmp.2014.94

Previous studies have indicated that mental health[7] and family cohesion[8] were associated with the adaptation to harsh conditions (APHC) after disasters. Experience and adaptation related to these incidents promote the civic mindedness of survivors in a community.[9] Furthermore, disaster reconstruction significantly predicts the recovery of survivors.[10] Therefore, this study surveyed residents living in the post-earthquake zones of Sichuan to determine the effect of HRQOL on APHC. The objectives of this study were to (1) provide empirical information about the HRQOL and APHC of residents living in post-earthquake zones; (2) analyze the effects of HRQOL on APHC and elucidate the effect mechanisms; and (3) provide the government and social organizations with suggestions for improving the APHC of residents living in post-earthquake zones.

METHODS

Data were obtained from a sample survey of 5 counties in Sichuan in May and June 2013. Multistage sampling was mainly used. First, 5 cities (Aba, Guangyuan, Deyang, Ya'an, and Chengdu) were selected from 39 areas greatly affected by the earthquakes. Then 1 county (Wenchuan, Qingchuan, Mianzhu, Lushan, and Dujiangyan) was selected from each city, and 400 survivors were randomly selected from each county. All selections were performed by simple random sampling.

Questionnaires were mainly distributed in the resettlement area that was built for survivors after the earthquake. Each participant independently completed the questionnaire under the instructions of investigators. A total of 1672 questionnaires were returned from the 2000 distributed, indicating an effectiveness rate of 83.6%.

Health-Related Quality of Life

The study uses a 12-item Short Form Health Survey (SF-12) to measure HRQOL. SF-12, which is a shorter version of the 36-item Short Form Health Survey (SF-36), helps to evaluate the quality of care in managed care plans and other health care applications. The validity of the Chinese version of the SF-12 has been previously proven.[11,12] The SF-12 briefly reproduces 8 domain profiles with few items. It is a practical alternative to the SF-36[13,14] while it promotes efficiency and decreases economic costs. Unlike the 5-dimensional European quality of health scale, SF-12 is sensitive to differences related to slight morbidity.[15] Previous studies have also proven that SF-12 is a feasible and acceptable approach for evaluating earthquake survivors.[16,17]

SF-12 has 8 domains: physical function (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social function (SF), role emotional (RE), and mental health (MH). The scale can also be divided into 2 domains: physical component summary (PCS) and mental component summary (MCS). PCS includes PF, RP, BP, and GH, and MCS includes VT, SF, RE, and MH.

Adaptation to Harsh Conditions

The complete success or the full recovery of a community's former status involves multiple factors,[18] and it may require a long time, because post-disaster reconstruction is an extensive long-term project that requires 7 to 10 years of economic development, risk mitigation, and poverty alleviation.[19] The Lushan earthquake intensely affected 32 areas, including Ya'an, Chengdu, and Deyang, causing various degrees of damage to infrastructures.[20] The investigation was conducted 1 month after the Lushan earthquake, in May and June 2013. The investigation conducted at that particular time could potentially measure well the APHC of residents living in post-earthquake zones. Therefore, the APHC has some available reference values.

The Chinese government has given tremendous effort to the post-earthquake reconstruction of Sichuan. An official 2008 document, titled "Master national plans for reconstruction work after Wenchuan earthquake," emphasized public services (including education, technology, health services, and social security), infrastructure, and ecological environment during reconstruction.[21] Based on this document, we developed a simple scale to measure the APHC of residents living in post-earthquake zones. The respondents were asked to evaluate the extent to which they have adapted to the bad ecological environment and the poor infrastructure, health service, social security system, education system, and technology system. A 5-point scale ("totally not," "not much," "moderate," "much," and "very much") was used; a higher score indicated that the respondent had better opinions toward APHC.

RESULTS

Reliability Tests

Reliability tests were conducted on the 2 scales. Reliability was evaluated by determining the system variation proportion of the scales, and it was reflected by the Cronbach α coefficient, which was expressed as follows:

$$\alpha = \frac{K}{K-1}\left(1-\frac{\sum_{i=1}^{K}\sigma_{Y_i}^2}{\sigma_X^2}\right)$$

where K is the number of samples, σ_X^2 is the variance of the total sample, and $\sigma_{Y_i}^2$ is the variance of observed samples. Internal consistency was considered good when the coefficient ranged from 0.7 to 0.8, and reliability was considered very good when the coefficient ranged from 0.8 to 0.9.

Reliability analyses for both scales showed that most of the Cronbach α coefficients of a single item were larger than 0.80. The overall Cronbach α coefficient for the SF-12 and APHC scales was 0.829 and 0.828, respectively. These values indicated good reliability of the scales. The α coefficients of each domain in SF-12 were as follows: 0.802 for PF; 0.807 for RP; 0.812 for BP, GH, and VT; 0.815 for SF; and 0.810 for RE. Only MH had a coefficient less than 0.80 (0.796).

https://doi.org/10.1017/dmp.2014.94 Published online by Cambridge University Press

TABLE 1

Descriptive Statistics for 12-Item Short-Form Health Survey

Domain	N	Mean	Variance	Skewness	Percentage of Scores < 50, %
PF	1672	42.75	31.390	0.223	47.19
RP	1672	41.81	39.391	0.298	40.55
BP	1672	44.23	37.446	0.185	49.22
GH	1672	37.78	37.620	0.419	55.92
VT	1672	48.25	37.559	−0.011	50.00
SF	1672	43.84	36.060	0.230	49.76
RE	1672	44.14	39.351	0.210	37.50
MH	1672	40.62	28.310	0.321	57.36

Abbreviations: BP, bodily pain; GH, general health; MH, mental health; PF, physical function; RE, role emotional; RP, role physical; SF, social function; and VT, vitality.

TABLE 2

Frequency for Adaptation to Harsh Conditions Scale

	Totally Not, %	Not Too Much, %	Moderate, %	Much, %	Very Much, %
Bad ecological environment	46.35	17.58	13.40	14.35	8.31
Poor infrastructure	34.63	25.66	16.33	15.73	7.66
Poor health services	27.63	26.97	22.43	15.97	7.00
Poor social security system	36.48	28.83	14.47	11.96	8.25
Poor education system	37.08	18.78	12.86	20.22	11.06
Poor technology system	31.40	30.74	13.52	16.03	8.31

For the domains of the APHC scale, the coefficients were 0.804 for bad ecological environment, 0.794 for poor infrastructure and technology system, 0.803 for poor health services, 0.811 for poor social security system, and 0.800 for poor education system. All coefficients of the domains indicated good internal consistency of a single domain. The results showed that the data were reliable for both scales.

Statistical Analysis

Table 1 shows a descriptive statistical analysis for SF-12, including the mean value. All data were less than the midpoint of the total score (equal to 50). GH had the lowest mean value of 37.78. The skewness of all domains except VT was larger than zero, indicating that the data distribution of most domains was right skewed. The percentage of scores was less than 50 and ranged from 37% to 58%, indicating that the majority of residents living in post-earthquake zones viewed their HRQOL as poor.

Table 2 shows the frequency of the APHC scale, including the proportion of the "totally not" option. This option was proportionately larger than the others, indicating that more respondents thought that they could not adapt well to APHC. Among the domains, bad ecological environment had the largest percentage of the "totally not" option (46.35%). The "very much" option was the smallest percentage, indicating that few respondents thought that they had good APHC. The sum of the "totally not" and "not too much" percentages were greater than that of the "much" and "very much" percentages, indicating that many survivors had not adapted well to APHC.

Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was used to confirm the correlations among several variables that were presented in the model. Several indicators could be used to evaluate the CFA model. For example, the corrected Akaike information criterion could be used to alleviate the complexity of the model (excessive parameters), whereas Browne-Cudeck criteria (BCC), Bayes information criteria (BIC), and Akaike information criterion could be used to compare several models. For the present study, 2 indicators (BCC_L and BIC_L) were selected as the evaluation standard. A larger value corresponded to a better model, and the largest value was 1. PCS and MCS had mutual influence correlations according to the CFA model (Figure 1).

Figure 1 shows that model 2 was the best model, because the values of BCC_L and BIC_L were both 1, the ratio of the χ^2 to the degree of freedom (χ^2/df) was 1.50, and the P value was .07. This model reached the standard when the significance level was .05. Thus, MCS showed a significant effect on PCS, whereas PCS showed an insignificant effect on MCS.

https://doi.org/10.1017/dmp.2014.94 Published online by Cambridge University Press

Structural Equation Model

The structural equation model (SEM) is widely used in various fields of social sciences. This method estimates the relationship among the observed variables, represents latent variables and factors in a group, and analyzes the relationships among the latent variables. The SEM comprises 2 parts: a testing model or CFA, which aims to test the suitability of the observed variables to measure latent variables or factors; and a structural equation that assesses the correlations among latent variables.

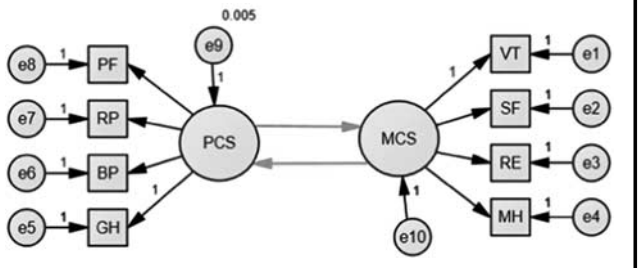
The results of the SEM indicated that PCS had a direct effect on APHC and that MCS exerted an indirect effect by affecting PCS. The SEM model (Figure 2) was established to analyze the effect of PCS and MCS on the APHC of residents living in post-earthquake zones. Except for PCS and MCS, a new latent variable APHC was created to present the APHC of residents living in post-earthquake zones.

SEM Goodness of Fit

Table 3 shows parts of the indicators for the total goodness of fit of the SEM model. The indicators reached the acceptable standard of a model and were close to the best value,

FIGURE 1

Confirmatory Factor Analysis (CFA) for the 12-Item Short-Form Health Survey.



BP indicates bodily pain; GH, general health; MCS, mental component summary; MH, mental health; PCS, physical component summary; PF physical function; RE, role emotional; RP, role physical; SF, social function; and VT, vitality.

TABLE 3

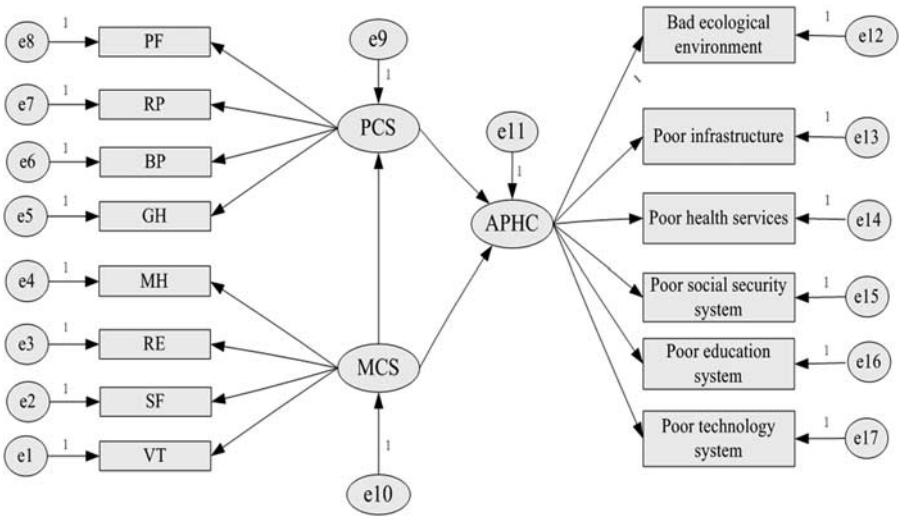
Indicators for the Goodness of Fit of Structural Equation Model

Indicators	Criteria of Adaptation or Critical Value	Test Results	Fitness
RMSEA	0.08 (<.05, very good; <.08, good)	0.026	Yes
GFI	>.90	0.986	Yes
AGFI	>.90	0.981	Yes
CFI	>.90	0.990	Yes
PNFI	>.50	0.819	Yes
PCFI	>.50	0.826	Yes

Abbreviations: AGFI: adjusted goodness-of-fit index; CFI, comparative fit index; GFI, goodness-of-fit index; PCFI: parsimonious CFI; PNFI, parsimonious normed fit index; RMSEA, estimated value of the root mean square error of approximation.

FIGURE 2

Structural Equation Model for the Impact of Health-Related Quality of Life on Adaptation to Harsh Conditions (APHC).



See Figure 1 for the explanation of abbreviations.

https://doi.org/10.1017/dmp.2014.94 Published online by Cambridge University Press

TABLE 4

Path Coefficients for Structural Equation Model

Path Coefficients	Standardized Estimate	Unstandardized Estimate	SE	CR	P[a]
PCS ← MCS	1.000	0.974	0.050	19.530	***
APHC ← MCS	0.008	0.009	0.047	0.186	.852
APHC ← PCS	0.936	1.000			
VT ← MCS	0.593	1.000			
SF ← MCS	0.562	0.910	0.048	19.134	***
RE ← MCS	0.603	1.066	0.053	20.206	***
MH ← MCS	0.759	0.965	0.041	23.737	***
GH ← PCS	0.577	1.000			
BP ← PCS	0.596	1.029	0.052	19.607	***
RP ← PCS	0.616	1.118	0.056	20.069	***
PF ← PCS	0.675	0.976	0.046	21.376	***
Bad ecological environment ← APHC	0.676	1.000			
Poor infrastructure ← APHC	0.721	1.014	0.039	26.098	***
Poor health services ← APHC	0.643	0.861	0.037	23.565	***
Poor social security system ← APHC	0.608	0.846	0.038	22.420	***
Poor education system ← APHC	0.658	1.020	0.042	24.080	***
Poor technology system ← APHC	0.703	0.985	0.039	25.522	***

[a] $P < .0001$ indicated by triple asterisks (***).

suggesting that the model fit the actual observed data. The external quality and convergent validity of the model were good. In this model, $\chi^2 = 163.400$, df = 76, $\chi^2/df = 2.150$ (<3), and estimated value of the root mean square error of approximation = 0.026 (<0.05). In addition, the goodness-of-fit index (GFI), adjusted GFI, and comparative fit index (CFI) were above 0.90. Parsimonious normed fit index and parsimonious CFI were above 0.50. These results showed that the total goodness of the fit was good and acceptable.

Path Coefficients for SEM

The results of the estimated path coefficients for the SEM are provided in Table 4, and includes the standardized and unstandardized estimates; the standardized error; the critical ratio, which is equivalent to the *t*-value or *z*-value; and the *P* values. The standardized and unstandardized estimates contained certain differences. This study used standardized estimates to analyze the influence size of all variables and to compare the values of each coefficient as a whole.

Table 4 showed the following findings:

- MCS significantly affected PCS. MCS exhibited the largest effect on PCS when the values of the overall standardized factor loadings were compared. This finding indicated that the psychological health of the survivors influenced their physical health.
- PCS significantly affected AHPC. The factor loading of the PCS was 0.936, which was second only to the factor loading of MCS to PCS. Results indicated that the PCS of residents living in post-earthquake zones affected APHC.
- MCS had an insignificant effect on APHC. The *P* value was.852, which was not considered statistically significant. The results indicated that the MCS of residents living in post-earthquake zones did not directly affect APHC but indirectly affected PCS.
- The standardized factor loadings of the latent variable APHC to the 6 observed variables were significant. The path coefficients of poor infrastructure (0.721) and poor technology system (0.703) were relatively larger than those of the others. The path coefficients of bad ecological environment (0.676), poor education system (0.658), and poor health services (0.643) followed. The path coefficient of poor social security system was the smallest at 0.608. The results indicated that the APHC of residents living in post-earthquake zones had the greatest effect on the adaptation to poor infrastructure and the least effect on the adaptation to poor social security system.

DISCUSSION

This study examined the HRQOL and APHC of residents living in post-earthquake zones and the effect of HRQOL on APHC. The main findings of this study were as follows: (1) the majority of respondents had not adapted well to post-disaster harsh conditions and viewed their HRQOL to be relatively poor; (2) HRQOL positively affected APHC and PCS showed a direct and greater effect, whereas MCS showed an indirect effect by directly affecting PCS; (3) APHC had the greatest effect on the adaptation to poor infrastructure, followed by the adaptation to poor technology system, bad ecological environment, poor education system, and poor health services. The adaptation to poor social security system had the smallest effect.

https://doi.org/10.1017/dmp.2014.94 Published online by Cambridge University Press

The results of this study disclosed that residents living in post-earthquake zones hold pessimistic attitudes toward their health and APHC, which is a major concern. The recovery of HRQOL and the improvement of APHC require long-term and consistent attention, yet nearly half of the respondents believe that they absolutely cannot adapt to the bad ecological environment.

Previous studies have shown that the service function of the ecosystem in Sichuan was seriously damaged by the earthquake.[22] Critical ecosystem services (water retention, soil conservation, and carbon storage) experienced considerable loss.[23] Earthquakes caused frequent geohazards that resulted in a great loss of people and harmed the local ecological environment.[24] This study showed that nearly 64% of the respondents have not adapted to the bad ecological environment. Thus, the government must realize the urgent need to reduce ecological damage in post-earthquake reconstruction work, particularly in areas with mountains and rivers.

HRQOL influences the adaptation of residents living in post-earthquake zones to harsh conditions to a varying extent. Previous studies have shown that an emergency medical response system is important after a major earthquake.[25] Moreover, the government organizes assistance policies that can alleviate the negative effects of earthquake on health.[26,27] Social support is related to the HRQOL of survivors.[28]

This study shows that HRQOL significantly affects the APHC of residents living in post-earthquake zones, mainly in their physical health. This finding highlights the important effect of physical health on APHC and resilience of sustained life. In addition, the essential role of infrastructure points out the great importance that improved infrastructure has during post-disaster reconstruction. Decision makers should focus on the recovery of the physical health of survivors by providing medical care and completing the construction of infrastructures.

Limitations

This study has a number of limitations. Because earthquakes affect not only various cities in Sichuan but in nearby provinces such as Gansu and Shaanxi as well, future studies should expand the sample scale. Also, the present study focuses solely on how the HRQOL of survivors affects their APHC. The scale is designed to reflect the situation in China and may not be applicable to other countries. In addition, adaptation is a dynamic process; the scale cannot reflect the changes through time because this study used cross-sectional data.

CONCLUSIONS

This study assessed the HRQOL and APHC of earthquake survivors in China and explored the effect of HRQOL on APHC. Studies on adaptation have rarely focused on natural hazards. To our knowledge, this study investigated APHC with a new perspective that is innovative in the field of public health preparedness. We developed an APHC scale based on post-disaster conditions in Sichuan. The majority of the residents surveyed believed that they had not adapted well to the difficult post-disaster conditions. The findings showed that HRQOL significantly affected APHC and that PCS had a greater and direct effect, whereas MCS had no direct effect on APHC. In addition, APHC had the greatest effect on the adaptation to poor infrastructure and the least effect on the adaptation to poor social security system. Government and society efforts need to be focused on the reconstruction and APHC improvement of earthquake survivors in Sichuan, China.

About the Authors

Department of Social Work and Social Policy, School of Social and Behavioral Sciences, Nanjing University, Nanjing (Ms Liang); and School of Communication and Design, Sun Yat-sen University, Guangzhou (Ms Lu), China.

Correspondence and reprint requests to Ying Liang, Department of Social Work and Social Policy, School of Social and Behavioral Sciences, Nanjing University, Nanjing, 210023 Peoples Republic of China (E-mail: njulucy79@163.com).

Acknowledgments

This paper is supported by the General Program of National Natural Science Foundation of China (71173099 & 71473117), the Youth Program of National Natural Science Foundation of China (70903002), and the Program for New Century Excellent Talents in University (NCET-11-0228).

Published online: October 22, 2014.

REFERENCES

1. Moriarty DG, Zack MM, Kobau R. The Centers for Disease Control and Prevention's Healthy Days Measures–Population tracking of perceived physical and mental health over time. *Health Qual Life Outcomes*. 2003; 1(1):37.
2. Tian W, Jia Z, Duan G, et al. Longitudinal study on health-related quality of life among child and adolescent survivors of the 2008 Sichuan earthquake. *Qual Life Res*. 2013;22(4):745-752.
3. Zhang X, Hu XR, Reinhardt JD, et al. Functional outcomes and health-related quality of life in fracture victims 27 months after the Sichuan earthquake. *J Rehab Med*. 2012;44(3):206-209.
4. Smit B, Burton I, Klein RJT, Street R. The science of adaptation: a framework for assessment. *Mitigation Adapt Strategies Global Change*. 1999;4(3–4):199-213.
5. Füssel HM. Adaptation planning for climate change: concepts, assessment approaches, and key lessons. *Sustain Sci*. 2007;2(2):265-275.
6. Berke PR, Kartez J, Wenger D. Recovery after disaster: achieving sustainable development, mitigation and equity. *Disasters*. 1993;17(2):93-109.
7. Green BL. Traumatic stress and disaster: mental health effects and factors influencing adaptation. *Int Rev Psychiatry*. 1996;2:177-210.
8. Tatsuki S, Hayashi H. Family system adjustment and adaptive reconstruction of social reality among the 1995 earthquake survivors. *Int J Japan Sociol*. 2000;9(1):81-110.
9. Takeda J, Tamura K, Tatsuki S. Life recovery of 1995 Kobe Earthquake survivors in Nishinomiya City: a total-quality-management-based assessment of disadvantaged populations. *Natural Hazards*. 2003;29(3):567-585.
10. Tatsuki S, Hayashi H. Seven critical element model of life recovery: general linear model analyses of the 2001 Kobe panel survey data. Paper presented at Proceedings of the 2nd workshop for comparative study on urban earthquake disaster management; February 14, 2002; Kobe, Japan.

https://doi.org/10.1017/dmp.2014.94 Published online by Cambridge University Press

11. Lam CLK, Tse EYY, Gandek B. Is the standard SF-12 Health Survey valid and equivalent for a Chinese population? *Qual Life Res*. 2005;14:539-547.
12. Liang Y, Wu W. Exploratory analysis of health-related quality of life among the empty-nest elderly in rural China: an empirical study in three economically developed cities in eastern China. *Health Qual Life Outcomes*. 2014;12:59.
13. Gandek B, Ware JE, Aaronson NK, et al. Cross-validation of item selection and scoring for the SF-12 Health Survey in nine countries: results from the IQOLA Project. International Quality of Life Assessment. *J Clin Epidemiol*. 1998;51(11):1171-1178.
14. Failde I, Medina P, Ramı´rez C, Arana R. Assessing health-related quality of life among coronary patients: SF-36 vs SF-12. *Public Health*. 2009;123:615-617.
15. Johnson JA, Coons SJ. Comparison of the EQ-5D and SF-12 in an adult US sample. *Q Life Res*. 1998;7:155-166.
16. Kun P, Wang Z, Chen X, et al. Public health status and influence factors after 2008 Wenchuan earthquake among survivors in Sichuan province, China: cross-sectional trial. *Public Health*. 2010;124:573-580.
17. Xu J, Ou L. Resilience and quality of life among Wenchuan earthquake survivors: the mediating role of social support. *Public Health*. 2014; 128:430-437.
18. Xu J, Li Y. Meta-synthesis pattern of post-disaster recovery and reconstruction: based on actual investigation on 2008 Wenchuan earthquake. *Nat Hazards*. 2012;60:199-222.
19. Dunford D, Li Li. Earthquake reconstruction in Wenchuan: assessing the state overall plan and addressing the 'forgotten phase'. *Applied Geography*. 2011;31:998-1009.
20. State Department Lushan Earthquake Recovery and Reconstruction Guidance Coordination Group. Master national plans for reconstruction work after Lushan Earthquake [in Chinese]; July 2013. http://chinaup.info/wp-content/uploads/2013/07/8566658525.pdf. 2013. Accessed July 19, 2014.
21. National Planning Team in Reconstruction Work after Wenchuan Earthquake. Master national plans for reconstruction work after Wenchuan earthquake [in Chinese]; August 12, 2008. http://www.mlr.gov.cn/xwdt/zytz/200809/t20080924_110308.htm. Accessed July 19, 2014.
22. Chen L, Wu F, Yang W, Zhang J. A comparison on ecosystem services before/after "5.12" Wenchuan earthquake. *Acta Ecol Sinica*. 2012;32(5): 271-273.
23. Wang YK, Fu B, Xu P. Evaluation the impact of earthquake on ecosystem services. *Procedia Environmental Sci*. 2012;13:954-966.
24. Yin Y, Wang F, Sun P. Landslide hazards triggered by the 2008 Wenchuan earthquake, Sichuan, China. *Landslides*. 2009;6(2):139-152.
25. Zhang L, Liu X, Li Y, et al. Emergency medical rescue efforts after a major earthquake: lessons from the 2008 Wenchuan earthquake. *Lancet*. 2012;379(9818):853-861.
26. Liang Y, Wang X. Developing a new perspective to study the health of survivors of Sichuan earthquakes in China: a study on the effect of post-earthquake rescue policies on survivors' health-related quality of life. *Health Res Policy Syst*. 2013;11:41.
27. Liang Y, Cao R. Employment assistance policies of Chinese government play positive roles! The impact of post-earthquake employment assistance policies on the health-related quality of life of Chinese earthquake populations. *Soc Indic Res*. 2014;1-23.
28. Ke X, Liu C, Li N. Social support and quality of life: a cross-sectional study on survivors eight months after the 2008 Wenchuan earthquake. *BMC Public Health*. 2010;10(1):573.

https://doi.org/10.1017/dmp.2014.94 Published online by Cambridge University Press