Health related quality of life among people living in disaster risk area, Kediri, Indonesia: A cross-sectional study

Ajeng Tias Endarti[a], Mondastri Korib Sudaryo[b], Isbandi Rukminto Adi[c],

Sudarto Ronoatmodjo[b]

[a]*Faculty of Health, Universitas MH Thamrin*

[b]*Faculty of Public Health, Universitas Indonesia*

[c]*Faculty of Social and Political Science, Universitas Indonesia*

Correspondence: ajengtias@gmail.com

On Feb 13, 2014, Kelud volcano, in Kediri District, Indonesia, erupted. The study is intended to examine the effect of the eruption on health related quality of life (HRQoL) among people living in different levels of volcano eruption risk area. A cross sectional study was conducted in and 252 subjects were randomly selected through multistage cluster sampling. There was no difference in mean score of HRQoL between those living in the high risk area (35.93) and those living in the moderate/low risk area (35.69). Age, monthly income and history of chronic disease were important predictors of HRQoL in the total population as well as in each risk area. Increase in age was associated with a decreased HRQoL (β -1.951 ; p 0.000). Chronic disease that existed post eruption has significantly lower score of HRQoL (β -7.709 ; p 0.014). HRQoL among people living in high risk area was associated with age, income, coping, depression, decreased income, and chronic disease. Factors associated with HRQoL in moderate/low risk area were age, employment, monthly income and history of chronic disease. Approaches to improve people's HRQol in the high risk area should involve psychological intervention and chronic disease prevention and control.

Keywords: *health-related quality of life; disaster risk area; volcano; Indonesia;*

INTRODUCTION

Health-Related Quality of Life (HRQoL) is defined as "individuals perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (WHO 1995). In Indonesia, Pradono et al (2009) showed the number with poor HRQoL to be two times higher in 2007 among population > 15 years than in 2003. WHO (2011) reported less than one tenth (7,6%) of the Indonesian population had poor HRQoL. The number would be expected to be higher among people living in disaster risk area.

HRQoL studies post disasters are commonly conducted in both the general and elderly populations. None of them, to our knowledge, were conducted after a volcano eruption. Volcano eruption causes

damage physically, socially and economically as well as increased morbidity among the affected population (Hansell et al 2006).

On February 13, 2014, Kelud Volcano erupted. Consequently, 66,139 people were evacuated and more than 10,000 houses were damaged, 70% of them had severely (Swastanto 2014). The Hazard Index (HI) of Kediri of 189 is one of highest level of hazard index experienced (BNPB 2011). People living in a disaster prone area are at higher risk of a lower HRQoL. A study after the Wenchuan earthquake in China showed that the HRQoL was lower in the area most affected (Wen et al 2012).

Ferrans Models of HRQoL identifies three factors directly affecting HRQoL, namely characteristics of individual, characteristics of environment and general health perception Ferrans et al 2005). In individual level, HRQoL is generally affected by injury, age, gender, mental health, comorbidity and individual social aspects (Polinder et al 2010; Gallegos-Carrillo et al 2009). Many studies have confirmed the association of the aforementioned aspects with HRQoL in different population settings (Swastanto et al 2014; Wen et al 2012; Ferrans et al 2005).

This study aimed to identify HRQoL score among people living in different levels of volcano eruption risk area and to examine the association between HRQoL and factors affecting it among people living in volcano eruption risk area.

METHOD

The study was conducted in Kediri District with total population was 1,603,041 (BPS 2015). A cross sectional study was conducted on March 2015 in four districts/*kecamatan*. These *kecamatan* were selected on the basis of that the area were severely affected during the February 2014 Kelud eruption (Satlak Kediri 2014). Selected subjects were those aged 18-65 years old and completed the interview and the questionnaire as well. With 90% power of study we calculated minimum sample size was 196.

The area of study (villages) was stratified according to the impact of the volcanic eruption. The categories were high risk area and low/moderate risk area as defined by District Disaster Management. All villages within the high risk area were selected (12 villages that covering 104.864 population (Satlak Kediri 2014)). Low/moderate risk villages close to the high risk villages were purposively selected (10 villages). Subjects were randomly selected using multistage cluster sampling.

For measuring health related quality of life (HRQoL), *the Indonesia Health Related Quality of Life (Ina-HRQoL)* questionnaire was used (Rivany 2004). The questionnaire consists of ten quality of life attributes including aspects on mobility, private activities, common and social activities, vision, hearing, food tasting, oral communication, communication, pain, depression and anxiety. The score scale for each question ranged from 0 (zero) referring to lowest ability to perform the quality of life

attribute to 3 (in 3 questions) or 4 (in 7 questions) referring to highest ability to perform the quality of life attribute.

Seven socio-demographic factors were included, which were age, income, gender, education, decrease in income and history of chronic disease and its onset. Psychological factors consisted of psychological trauma history, coping strategy and depression. The data of disaster-related factors consisted of evacuation experience and damage to property was also collected. In assessing the association between HRQoL and its related factors, we used general linearized model (GLM). All statistical analysis was performed using licensed STATA ver. 9.

Written informed consent were obtained from all subjects voluntarely agreed to participate in this study. Ethical clearance was obtained from the Ethical Research Committee of Faculty of Public Health (FPH), Universitas Indonesia (UI).

RESULTS

Of the 252 participants, all successfully completed the interview and questionnaire. The percentage of respondents who came from high disaster risk area (43,2%) was lower than those from medium/low disaster risk area (56.7%). Total mean score of HRQoL was 35.69 (of the maximum score 37). Thus, people in this area generally had a good HRQoL.

There was no difference in the HRQoL score between high risk (35.95) and moderate/low risk area (35.48) (p=0.373). Five of thirteen independent variables had significant different score and distribution among each risk area. Within high risk area, mean score of depression was higher than in people living in the moderate/low risk area (3.18 vs. 2.45; p=0.000). The proportion of people having psychological trauma, evacuation experiences and damaged of property were higher among high risk area. Meanwhile socio-demographic characteristics of respondents (age, gender, educational level, employment) and income (current income and decreased income post eruption) did not differ between high and moderate/low risk areas. In addition, coping score and history of chronic disease did not differ significantly among risk areas.

Within each risk area, there are different factors affecting HRQoL. However age and existence of chronic disease post eruption were variables affecting HRQoL in the total population as well as in each risk area. It showed that age had a negative association with HRQoL (Table 2). Every year increase of age was followed by decrease the HRQoL score by 2 points (β -1.951; p=0.000). The presence of chronic disease post eruption lowered HRQoL almost eight points (β -7.709; p=0.014).

HRQoL among people living in the high risk area was associated with age, monthly income, decreased income, score of coping and depression, and history of chronic disease. Higher age and scores of coping and depression were correlated with lower score of HRQoL. The presence of

decreased income and incidence of chronic disease post eruption was correlated with lower score of HRQoL.

Factors affecting HRQoL in moderate/low risk area were fewer than those in high risk area. It was assciated with age, employment, monthly income and incidence of chronic disease. Older respondents had lower HRQoL (β -2.091; *p=0.000).* So did those who were not employed (β -8.532; p=0.000), increased in monthly income (β 0.005; p=0.035) and having incidence of any of chronic disease post eruption (β -10.164; p=0.010).

Table 1. Distribution of HRQoL score and its factors according to type of disaster risk area

Variable (n=252)	High risk area	Moderate and low risk area	Total	P value[#]
	n=109(43.3%)	n=143(56.7%)	n=252(100%)	
Score of HRQoL (mean(SD))	35.95 (9.6)	35.48(12.6)	35.69(11.6)	0.373
Socio-demographic factors				
Age (year) (mean(SD))	45.25(12.7)	44.05(17.0)	44.57(15.3)	0.524
Gender				
Female	57(52.3%)	75(52.5%)	132(52.4%)	0.981
Male	52(47.7%)	68(47.5%)	120(47.6%)	
Education level				
Moderate and high	20(18.3%)	35(24.5%)	55(21.8%)	0.243
Primary	89(81.7%)	108(75.5%)	197(78.2%)	
Employment				
Employed	88(80.7%)	100(69.9%)	188(74.6%)	0.051
Housewife/unemployed	21(19.3%)	43(30.1%)	64(25.4%)	
Income				
Monthly income (Rupiah)	893,577	783,986	831,388	0.117
(mean(SD))	(1,047,662)	(826,580)	(928,312)	
Decreased income post eruption				
No				
Yes	73(67.0%)	110(76.9%)	183(72.6%)	0.079
	36(33.0%)	33(23.1%)	69(27.4%)	
Psychological factors				
Score of coping (mean(SD))	21.85(6.0)	21.75(5.4)	21.79(5.7)	0.653
Score of depression (mean(SD))	*3.18(2.2)*	*2.45(2.8)*	*2.76(2.6)*	*0.000**
Psychological trauma				
No	*62(56.9%)*	*113(79.0%)*	*175(69.4%)*	*0.000**
Yes	*47(43.1%)*	*30(21.0%)*	*77(30.6%)*	
History of chronic disease				
No disease	66(60.5%)	99(69.2%)	165(65.5%)	
Exist post eruption	15(13.8%)	11(7.7%)	26(10.3%)	0.298

Exist prior eruption	28(25.7%)	33(23.1%)	61(24.2%)		
Disaster-related factors					
Evacuation experience					
No	*23(21.1%)*	*112(78.3%)*	*135(53.6%)*	*0.000**	
Yes	*86(78.9%)*	*31(21.7%)*	*117(46.4%)*		
Property damaged					
No damaged	*1(0.9%)*	*39(27.3%)*	*40(15.9%)*		
Damaged	*108(99.1%)*	*104(72.7%)*	*212(84.1%)*	*0.000**	

[#]For continuous data using Mann Whitney-U test (except for Age, using t-test);

For categorical data using chi-square

*p < 0.05

Table 2. Final model of factors affecting health related quality of life according to level of risk area

Variables	High risk area n=109(43.3%)			Moderate/low risk area n=143(56.7%)			Total n=252(100%)		
	B	SE	p	B	SE	p	B	SE	p
Socio-demographic factors									
Age (year)	-1.459	0.846	0.003	-2.091	0.801	0.000	-1.951	0.702	0.000
Employment									
Employed						Ref			Ref
Housewife/unemployed	-2.164	4.645	ns	-9.634	4.778	0.000	-8.532	4.069	0.000
Income									
Monthly income	0.004	0.003	0.038	0.005	0.003	0.034	0.005	0.003	0.001
Decreased income post eruption			Ref			Ref			Ref
No	-6.719	4.235	0.012	4.268	5.024	ns	2.859	4.045	ns
Yes									
Psychological factors									
Score of coping	-2.090	1.206	0.003	-1.383	1.412	ns	-1.896	1.140	0.006
Score of depression	-3.231	1.967	0.007	-2.483	1.956	ns	-2.740	1.677	0.008
History of chronic disease			Ref			Ref			Ref

Never	-7.212	5.027	0.040	-	6.314	0.010	-7.709	4.942	0.015
Exist post disaster	-5.552	4.492	ns	10.164	5.166	Ns	-5.635	4.230	ns
Exist prior disaster				-6.289					

ns = not significance for p < 0.05 (by general linear model)

DISCUSSION

A year after the disaster, HRQoL score of people in the volcano high risk area were relatively similar with those living in the moderate/low risk area. A different result was found 3 years after the Wenchuan earthquake, which both physical and mental component scores were significantly lower in hard hit area compared with less hit area (Wen et al 2012).

The aforementioned result might be caused by the time of observation, which was a year after the eruption. According to the qualitative study conducted with the communities and heads of village, three months after the disaster they had bounced back to their normal life as before the eruption. At the time of this study, most were already back to work, even in the severely damaged agricultural sector. It also implies that people in this area were considerably resilience regardless of the level of risk area

Observations were made one year after the disaster by Ardalan et al (2011) and Papanikolaou et al (2012). Meanwhile Sudaryo et al (2012) and Wang et al (2000) assessed HRQoL within 6 and 9 months, respectively, of a disaster. Those studies concluded that disaster impact to HRQoL was both short and long term. To date, there is no consensus on the appropriate time after a disaster to observe HRQoL.

In addition to, the small number of reported eruption-related injuries (1.8%) also contributed to preventing deterioration of people's HRQoL. This is considered as the success of eruption prevention and mitigation program. In the months prior to the eruption people were having evacuation simulation and authorities had prepared the Standard Operational Procedure (SOP) of evacuation. Days before the eruption, coordination among eruption-related local authorities was intensified. As a result, the elderly and children had been evacuated before the eruption.

HRQoL is an individual's subjective assessment of their life circumstances (Skevington et al 2004). The high score within this population showed they had a good quality of life. This may be related to the Javanese characteristic known as *Narimo ing pandum*. It means that people have resignation to all provisions of God. Their belief is that their life course is already determined, they only undergo what they think they should do, so they are not ambitious. Disaster is fully considered as faith. This characteristic was also found during post Sleman (another Javanese area) earthquake 2008 that showed high median score of HRQoL (72.69 of 100) (Nurhasanah 2008).

In this study HRQoL is negatively correlated with age of respondents. Those of older age have lower HRQoL scores, similar to the results of Wen et al (2012) after the Wenchuan earthquake and within normal circumstances (Pradono et al 2009). Variable of age is a demographic characteristic reflects the ageing process and individual experiences regarding both risk and preventive factors, and social processes that influence an individual life course (Byles dan Tavener 2015).

People living in an area at high risk of volcano eruption should have a good coping skill in order to improve their HRQoL. Garcia (2010) depicted coping as individual cognitive effort and behaviors to control and cope with stress. It is not considered as individual characteristic, the emphasis is on a process. Coping is implemented through expression of positive emotion such as positive thinking and focused problem solving (Tugade et al 2004). In coping assessment, Wahl et al (1999) employed *confrontative coping* and *normalizing/optimistic coping* and its combination as well. The latter type of coping was significantly negative correlated with HRQoL score. A similar result was found in this study. According to the qualitative study, people in the area surrounding Kelud Volcano has a positive coping ability as shown by their ability to face the disaster. People considered Kelud eruption as a gift, since, based on their experience, after the eruption fertility of the land increased. They are grateful for whatever happens.

Depression score among people living in high risk area was significantly higher than in those living in the low/moderate risk area. This result supports findings of study in Northen China nine months post earthquake disaster (Wang et al 2000). According to the qualitative study of dwellers in the Kelud area, the main impact of the eruption was economic and this led to depression. This is one of important predictor of HRQoL in this population.

This study revealed that incidence of chronic disease was significantly correlated with score of HRQoL. Similarly, a study in Germany showed that the presence of only one chronic disease is enough to lower the score of HRQoL. According to CDC (2003) chronic diseases affect a person's ability to perform daily activities, including work. Other negative effects include treatment of chronic disease itself, particularly related with cost and side effects of medication, affordability of care, access to good care and caregiver and family issues.

CONCLUSION

A year post Kelud Volcano eruption, HRQoL score of people living in high risk area was slightly lower than those in moderate/low risk area. This study revealed that the approach to improving people's HRQoL post eruption should be different in high risk and moderate/low risk area. Among those who are living in high risk area, intervention should involve psychological aspects to improve coping and prevent depression. A program of psychological intervention could be integrated with

chronic disease control and prevention. Community empowerment, particularly for the elderly and unemployed person/housewife, need to be amplified in moderate/low risk area.

ACKNOWLEDGMENT

REFERENCES

Ardalan, A., et al. 2011. Post-disaster quality of life among older survivors five years after the Bam earthquake: implications for recovery policy. *Ageing & Society* 31(02): p. 179-196.

BNPB. 2011. *Buku index rawan bencana*. Jakarta: BNPB.

BPS. 2015 *Jumlah penduduk Kabupaten Kediri 2010-2013*. Kediri: BPS Kab. Kediri.

Byles, J.E. and M.A. Tavener. 2015. *Health of older people*, in *Oxford text book of global public health. Ed.* R. Detels, et al. Oxford: Oxford University Press. p. 1408-1424.

CDC 2003. Health related quality of life reveals full impact of chronic disease. *Chronic Disease Notes and Reports* 6(1).

Ferrans, C.E., et al. 2005. Conceptual model of health-related quality of life. J Nurs Scholarsh 37(4): p. 336-342.

Gallegos-Carrillo, K., et al. 2009. Social networks and health-related quality of life: a population based study among older adults. *Salud Pública Mex* 51(1): p. 06-13.

Garcia, C. 2010. Conceptualization and measurement of coping during adolescence: A review of the literature. *J Nurs Scholarsh* 42(2): p. 166-185.

Hansell, A.L., C.J. Horwell, and C. Oppenheimer. 2006. The health hazards of volcanoes and geothermal areas. *Occup Environ Med* 63(2): p. 149-156.

Mielck, A., M. Vogelmann, and R. Leidl. 2014. Health-related quality of life and socioeconomic status: inequalities among adults with a chronic. *Health Qual Life Outcomes* 12(58).

Nurhasanah. 2008. *Hubungan tingkat depresi dengan kualitas hidup pada daerah bencana pasca gempa bumi di Kabupaten Sleman tahun 2008*. Yogyakarta: Universitas Gajah Mada

Papanikolaou, V., D. Adamis, and J. Kyriopoulos. 2012. Long term quality of life after a wildfire disaster in a rural part of Greece. *Open Journal of Psychiatry* 2(02): p. 164-170.

Polinder, S., et al. 2010. A systematic review of studies measuring health-related quality of life of general injury populations. *BMC Public Health* 10(783).

Pradono, J., D. Hapsari, and P. Sari. 2009. Kualitas hidup penduduk Indonesia menurut International Classification of Functioning, Disability and Health (ICF) dan faktor-faktor yang mempengaruhinya (Analisis Lanjut Data RISKESDAS 2007). *Buletin Penelitian Kesehatan* Suplemen 2009: p. 1-10.

Rivany, R. 2004. *Pengembangan Model Indonesia Health Related Quality of Life pada Cost Utility Analysis. Studi Kasus Pengobatan Penyakit Infeksi (TBC) dan Non-infeksi (Hipertensi).* Depok: Universitas Indonesia.

Satlak Kediri. 2014. *Wilayah terdampak erupsi Kelud 2014.* Kediri: Satlak Penanggulangan Bencana Kab. Kediri

Sudaryo, M.K., et al. 2012. Injury, disability and quality of life after the 2009 earthquake in Padang, Indonesia: a prospective cohort study of adult survivors. *Glob Health Action* 5: p. 11816.

Skevington, S.M., M. Lotfy, and K.A. O'Connell. 2004. The World Health Organization's WHOQOL-BREF quality of life assessment: psychometric properties and results of the international field trial. A report from the WHOQOL group. *Qual Life Res* 13(2): p. 299-310.

Swastanto, G.A., et al. 2014. *Pelaksanaan rehabilitasi-rekonstruksi fisik pasca-erupsi Gunungapi Kelud 2014 di Kabupaten Kediri*, in *Bunga rampai penelitian: Pengelolaan bencana kegunungapian Kelud pada periode krisis erupsi 2014*. Ed. Junun Sartohadi. Pustaka Pelajar: Yogyakarta.

Tugade, M.M., B.L. Fredrickson, and L. Feldman Barrett. 2004. Psychological resilience and positive emotional granularity: Examining the benefits of positive emotions on coping and health. *J Pers* 72(6): p. 1161-1190.

Wahl, A., et al. 1999. Coping and quality of life in patients with psoriasis. *Qual Life Res* 8(5): p. 427-433.

Wang, X., et al. 2000. Post-earthquake quality of life and psychological well-being: Longitudinal evaluation in a rural community sample in northern China. *Psychiatry Clin Neurosci* 54(4): p. 427-433.

Wen, J., et al. 2012. Quality of life, physical diseases, and psychological impairment among survivors 3 years after Wenchuan earthquake: a population based survey. *PloS one* 7(8): p. e43081.

WHO. 1995. *Resources for new WHOQOL centers.* Geneva: WHO (MNH/PSF/95.2).

WHO. 2011. *WHODAS 2.0.* Geneva: World Health Organization.