Users' long-term satisfaction with post-disaster permanent housing: a case study of 2010 Merapi Eruption, Indonesia

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Abstract. An objective evaluation of users' long-term satisfaction with the post-disaster permanent housing provided is important for judging the successes or failures of housing reconstruction programs. Focussing on four resettlement sites built via the REKOMPAK program after the 2010 Merapi eruption, this paper examines the users' long-term satisfaction with the provided housing, and explores how their satisfaction level relates to their demographic characteristics and level of participation in the reconstruction processes. The results show that the households are in overall satisfied with the present housing. Their overall satisfaction level is statistically positively associated with household income, but not their level of participation and other demographic characteristics. These findings provide evidence on a satisfactory outcome in the long-term for the REKOMPAK, a community-based reconstruction program that was implemented in Indonesia since 2004, and a useful insight for local authorities, humanitarian and other agencies involved in post-disaster reconstruction program.

1 Introduction

The Merapi volcano eruption in Oct 2010 was an unusually large magnitude explosive eruption that caused over 350 fatalities and more than 300,000 people evacuated [1]. Close to 3900 houses were damaged in the affected areas, and more than 75% of all housing damaged by the eruption were in the Slemen Regency in Yogyakarta Province [2]. Cangkringan district is one of the fourteen districts in the Slemen Regency, and was worst affected by the 2010 Merapi Eruption with over 2500 houses destroyed [3]. The post-disaster housing reconstruction was implemented through a scheme called REKOMPAK with funding from the Java Reconstruction Fund contributed by donors after Central Java earthquake in 2006 [4]. Under the REKOMPAK program, there are fifteen resettlement sites (called *huntap*, permanent settlements) with 1596 houses built in the five villages that make up the Cangkringan district. Focussing on four resettlement sites in Cangkringan district, this paper examines the users' long-term satisfaction with post-disaster permanent housing, and explores how their satisfaction level relates to their demographic characteristics and level of participation in the reconstruction processes.

2 The REKOMPAK

The REKOMPAK (community-based rehabilitation and reconstruction settlement project) is an owner-driven program that requires beneficiaries to make decision and to organize for their own recovery, giving them a sense of control of the future [4]. For reconstruction in Merapi, the REKOMPAK program was implemented with previous experiences and lessons learnt drawn from its implementation in natural disasters between 2004 and 2010 in Indonesia. Maly et al. [2] categorised that the fifteen resettlement sites in Cangkringan into five typologies based on the housing and infrastructure provision and sources of fund, namely: (a) collective resettlement sites; (b) independent collective resettlement, (c) combined support collective resettlement; (d) independent individual reconstruction; and (e) independently non-REKOMPAK supporter rebuilding. Type A was the typical type in most resettlement sites where the planning and construction of permanent housing were carried out by resident group representatives with the support from facilitators provided by REKOMPAK. The funding was in the amount of 30 million Rupiah for building a 6 x 6 meter reinforced concrete block house on 100m² lot of village-owned land for each household. While the resettlement sites vary in scale, characteristics, construction timelines, degree of housing expansion and inhabitation, and

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livelihood opportunities, the REKOMPAK program had called for the community participation in the various reconstruction processes.

There has been much evidence in the literature on the importance of community participation in post-disaster reconstruction program for high level of beneficiary satisfaction (e.g., [5-7]). In addition, authors have emphasized on the importance of objective evaluations of permanent housing built for disaster victims in the long-term (e.g., [6-8]). Changes in resident satisfaction and permanency at a post-disaster housing sites in the long-term may lead to the home owners abandon the provided housing (e.g., [9-11]). Given that evaluation is difficult and may be omitted by donors, past evaluations often focus on easily enumerable aspects of reconstruction, such as the number of houses, schools and clinics built [6]. Literature on evaluation of users' long-term satisfaction remains scarce, this study aims to address this research gap by focussing on four resettlement areas built under the REKOMPAK program after 2010 Merapi Eruption. As it was a community-based reconstruction program, this study provides an insight into the relationship between the users' long-term satisfaction and their level of participation in the reconstruction. The empirical evidence would have implications on the development of the respective guidelines and policies for local authorities, humanitarian and other agencies.

3 Research method

A survey research design was adopted in this study for its abilities to provide a relatively quick and efficient method to (i) obtain information from the targeted sample, and (ii) generalize the research findings based on the sample involved. The data collection instrument is a structured survey questionnaire written in Bahasa Indonesia, and data was collected via a field survey between Dec 2017 and Feb 2018. As part of a larger project on testing a conceptual framework on users' long-term satisfaction with post-disaster permanent housing in Oo et al. [12], there are six sections in the questionnaire. The results reported in this present work are related to the users' overall satisfaction and how it relates to their demographic characteristics and level of participation in the reconstruction processes. Table 1 shows the number of households participated in the survey from four resettlement areas, namely: (i) Batur, (ii) Pagarjurang; (iii) Gondang 2; and (iv) Dongelsari, which are marked as Huntap 4, 5, 7 and 9 in Figure 1. These major resettlement areas are Type A collective resettlement areas built under the REKOMPAK on village-owned land. The total number of houses (738) built in these resettlement areas represents 46% of the total of 1596 houses built in Cangkringan District, Slemen Regency. For the data analysis focussing on long-term perspective, 285 (out of 297) sets of completed surveys were included based on a selection criterion that the households must

have stayed in the post-disaster permanent housing for at least 5 years (i.e., moved in before year 2014). The response rates range between 31 and 57% for the four resettlement areas, which are considered high and representative.

Table 1. Number of households participated in the survey

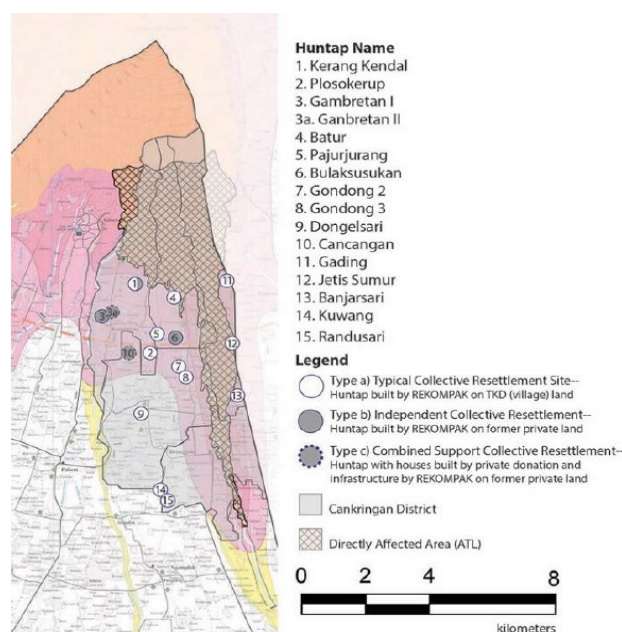| Resettlement site (Huntap)	No. of houses built	No. of households moved in before 2014	Response rate (%)
Batur (4)	206	96	46.60
Pagerjurang (5)	301	96	31.89
Gondang 2 (7)	84	48	57.14
Dongelsari (9)	147	45	30.61
Total	738	285	38.62

Fig. 1. Collective resettlement sites (Huntap) in Cangkringan District, Slemen Regency (Source: [2])

4 Results and discussion

Table 2 shows the characteristics of respondents and households participated in the study. The majority of them (72%) moved into the present house in year 2012, and the biggest age group (51%) is between 36 and 55 years old. The typical family size is three to four members with grown-up children as the majority (86%) of the households have no children younger than six years old. Almost all households (91%) have two to three economically active members who are either employed or self-employed. Sixty percent of the households with a monthly household income of less than 1 million Rupiah (around USD 70 at March 2018 exchange rates).

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Table 2. Characteristics of respondents and households

Characteristics	Frequency	%
Gender of respondents		
Male	172	60.35
Female	113	39.65
Year moved in		
2010	5	1.75
2011	39	13.68
2012	204	71.58
2013	37	12.98
Age of respondents		
< 25	33	11.58
26 to 35	44	15.44
36 to 45	74	25.96
46 to 55	72	25.26
56 to 65	39	13.68
> 65	23	8.07
Employment status of respondents		
Employed/ self-employed	226	79.30
Housewife	42	14.74
Student	12	4.21
Unemployed	5	1.75
No. of economically active members in household		
1.0	9	3.16
2.0	168	58.95
3.0	92	32.28
4.0	16	5.61
Monthly household income		
< Rp 1 million	171	60.00
Rp 1-2 million	93	32.63
Rp 2-3 million	16	5.61
Rp 3-5 million	5	1.75
No. of people live permanently		
1	15	5.26
2	44	15.44
3-4	198	69.47
5-8	28	9.82
No. of elderly (56 and above)		
0	184	64.56
1	61	21.40
2	40	14.04
No. of children (younger than 6)		
0	245	85.96
1-2	38	13.33
3-4	1	0.35
5 and above	1	0.35

When the respondents were asked about their overall satisfaction with the present permanent housing, the mean scores of four resettlement areas are close to or slightly above 4 'satisfied' (Table 3). Although most of the respondents are in overall 'satisfied' with the present housing, it is noted that percentages of respondents from Batur (21%) and Dongelsari (11%) who were 'very satisfied' are higher than that of Pagerjurang (3%) and Gondang 2 (2%). Despite the lower perceptions from the two former resettlement areas, their rather high overall satisfaction provides indicative evidence that the permanent housing provided via the REKOMPAK resettlement program are well-received by the success of the REKOMPAK program in Merapi to past experiences and lessons learnt from its implementation in Aceh post-tsunami and Central Java earthquake in 2006 ([2, 3]).

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Table 4 shows the respondents' (or households') level of participation in the permanent housing reconstruction processes. About one-third of them did not participate in any of the reconstruction processes. While the remaining 191 (67%) households had participated in different processes, only about 10% of the households were involved in more than three processes. The largest group (27%) had participated in at least two processes.

Table 4. The respondents' level of participation in the housing reconstruction processes

Level of participation	Frequency	%
No participation	94	32.98
Participated in different processes		
1 process	50	17.54
2 processes	76	26.67
3 processes	37	12.98
4 processes	14	4.91
5 processes	4	1.40
6 processes	3	1.05
7 processes	7	2.46

Table 5 shows the correlation test results between the respondents' overall satisfaction with the present housing and their demographic characteristics and level of participation in the reconstruction processes. The household monthly income is the only demographic factor that is statistically positively correlated to the respondents' overall satisfaction ($r_s = 0.179$, $p < 0.01$). This suggests that having higher household income is related to higher overall level of satisfaction. On the other hand, it is indeed surprising to find that there is no statistically significant positive correlation between the respondents' overall satisfaction and level of participation. This finding provides indicative evidence that the resident group representatives and the REKOMPAK facilitators were successfully in informing community during the reconstruction processes that leads to high satisfaction level, even not all the households had participated. A further examination shows that the mean overall satisfaction scores of those participated in the reconstruction process (3.95) is slightly lower than those who did not participate at all (4.02). These findings could possibly be explained because those involved were more critical of the housing conditions or had higher expectations that cannot be met during the reconstruction processes. Nonetheless, apart from household income, the overall satisfaction level of the respondents from all four resettlement areas are considerably high (mean scores of close to 4 out of 5) regardless of their age, education, family size, number of children and elderly in the family, number of years of living in, and level of participation in the reconstruction processes.

Table 3. The respondents' overall satisfaction with the present housing

Resettlement site (Huntap)	N	Percentage of respondents, scale 1 to 5					Mean score	Std. Dev.
		Very dissatisfied	Dissatisfied	Neither dissatisfied nor satisfied	Satisfied	Very satisfied		
Batur	96	0.00	0.00	14.58	64.58	20.83	4.06	0.59
Pagerjurang	96	0.00	3.13	3.13	90.63	3.13	3.94	0.43
Gondang 2	48	0.00	6.25	6.25	85.42	2.08	3.83	0.56
Dongelsari	45	0.00	0.00	8.89	80.00	11.11	4.02	0.45

Table 5. Correlation between the respondents' demographic characteristics, level of participation and overall satisfaction

	Spearman's rho correlation coefficient							
	Age	No. of people living in	No. of elderly	No. of children	Education	Household monthly income	No. of years living in	Level of participation
Overall satisfaction	-0.005	0.010	0.009	0.003	0.095	0.179**	-0.001	-0.081

** Correlation is significant at the 0.01 level (2-tailed)

5 Conclusion

As part of a larger project on testing a conceptual framework on users' long-term satisfaction with post-disaster permanent housing, this paper examined users' overall long-term satisfaction with post-disaster permanent housing in four resettlement areas following the 2010 Merapi eruption. Although the households have varying perceptions of the present housing, its location and neighbourhood, they are in overall satisfied with the present housing. Despite the high level of community participation (about two-third of the households had participated) in the reconstruction processes via the REKOMPAK program, the results show that their overall satisfaction level is statistically positively associated with household income, but not their level of participation and other demographic characteristics including age, education, family size, number of children and elderly in the family, and number of years of living in the present housing. Nonetheless, the evidence is suggestive that the REKOMPAK program were well-received by the households affected by 2010 Merapi eruption. For the next stage of this project, further statistical analysis will be conducted to examine the inter-relationships of users' demographic characteristics, reconstruction project delivery processes, attributes of permanent housing, and users' long-term satisfaction.

References

[1] Global Volcanism Program, Report on Merapi (Indonesia). In: Sennert, S K (ed.), Weekly Volcanic Activity Report, 26 October-1 November 2016. Smithsonian Institution and US Geological Survey (2016).

[2] Maly, E., Iuchi, K., Nareswari, A., Community-based Housing Reconstruction and Relocation: REKOMPAK program after the 2010 Eruption of Mt. *Merapi, Indonesia Institute of Social Safety Science Journal*, **27** (2015), 205-214.

[3] Samekto, C.B.D., Nuh, M., Community-based Housing Reconstruction and Relocation: REKOMPAK program after the 2010 Eruption of Mt. Merapi, *Journal of Public Administration Studies*, **1** (2017), 64-70.

[4] The World Bank, *REKOMPAK: Rebuilding Indonesia's Communities After Disasters. Jakarta, Indonesia*. The Secretariat of the Multi Donor Fund for Aceh and Nias and the Java Reconstruction Fund (2012).

[5] Davidson, C.H., Johnson, C., Lizarralde, G., Dikmen, N., Sliwinski A., Truths and myths about community participation in post-disaster housing projects. *Habitat International*, **31**(2007), 100-115.

[6] Fanany, I., Towards a model of constructive interaction between aid donors and recipients in a disaster context: the case of Lampuuk. In: Clarke M, Fanany I (eds), *Post-disaster reconstruction: Lessons from Aceh.* London: Taylor and Francis; (2010), 107-125.

[7] Dias, N.T,, Keraminiyage, K., De Silva, K.K., Long-term satisfaction of post disaster resettled communities: the case of post tsunami–Sri Lanka. *Disaster Prevention and Management*, **25**(2016), 581-594.

[8] Tas N, Cosgun N, Tas M., A qualitative evaluation of the after earthquake permanent housings in Turkey in terms of user satisfaction—Kocaeli, Gundogdu Permanent Housing model. *Building and Environment*, **42** (2007), 3418-3431.

[9] Barenstein, J.D., Housing reconstruction in post-earthquake Gujarat: a comparative analysis. Humanitarian Practice Network at Overseas Development Institute, (2006), network paper 54.

[10] Ahmed, I., McEvoy, D., Post-disaster housing reconstruction: Post-occupancy case studies from Sri Lanka. In Proceedings of ANZAScA 44th annual conference, Auckland (2010).

[11] Manatunge, J.M.A., Abeysinghe, U. Factors affecting the satisfaction of post-disaster resettlers in the long term: A case study on the resettlement sites of tsunami-affected communities in Sri Lanka. *Journal of Asian Development*, **3**(2017), 94-124.

[12] Oo, B.L., Sunindijo, R., Lestari, F. Users' long-term satisfaction with post-disaster permanent housing programs: A conceptual model, *International Journal of Innovation, Management and Technology,* **9**(2018), 28-32.

[13] Mei, E.T.W., Fajarwati, A., Hasanati, S., Sari, I.M., Resettlement following the 2010 Merapi Volcano eruption. *Procedia-Social and Behavioral Sciences*, **227** (2016), 361-369.

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