Lesson Learned
From 2009 Sumatera Earthquake
Housing Reconstruction

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SUMMARY
On September 30th 2009, a M 7.6 earthquake occurred about 57 kilometers Northwest of the low-lying coastal City of Padang, the capital city of Indonesia's West Sumatera Province. The earthquake caused more than 1,100 fatalities, a third of them were severely damaged and injured another 2009 people. More than 300,000 housings and buildings in Padang and Padang Pariaman regency suffered various degree of damaged, even loss of housings, destroyed livelihoods, protection and private building. Effective housing reconstruction to build back better is essential to restore affected community's dignity, society, economy, and cultural identity. This paper aims at contributing the discussion through an exploration of Government Policy and Local Perception of housing reconstruction to build back better the aftermath of the earthquake that hit West Sumatera, Indonesia on September 2009.

Keywords: earthquake, damaged house, rehabilitation, and reconstruction

1. WEST SUMATRA SEPTEMBER 30th 2009 EARTHQUAKE

A massive earthquake struck the West Sumatra province of Indonesia on Wednesday, 30 September 2009 at 17.16 pm. Based on the information from the Government Agency of Climatology, Meteorology and Geophysics (BKMG), the 7,9 SR earthquake epicenter was located at coordinates 0.84 LS - 99.65 BT, 71 km deep and 57 km away from the southwest of Pariaman district, West Sumatra. A 6,2 SR aftershock happened just 22 minutes after, with the epicenter at coordinates 0,72 LS – 99,94 BT, 22 km from Pariaman district. This earthquake occurred due to the subduction of the Indian Ocean tectonic plate beneath the Asia Pacific plate. The destructions have resulted in thousands of families becoming homeless, some living in camps, and others living in the homes of relatives. The earthquake also caused the disruption of the government, economics, and social activities. The map of the earthquake locations can be seen in **Figure 1.1.** When the emergency response came to an end on November 30th, 2009, further efforts are needed to be continuously taken in the forms of post-quake reconstructions and rehabilitations by re-developing the people housings, infrastructure and public services, with additional focus on health, social and livelihoods recovery.

The 30 September 2009 earthquake has caused serious damages to the housing and infrastructure of the communities in 12 districts/cities, causing extensive psychological trauma. This damage extended 100 kilometers along the coast of West Sumatra and up to 50 miles inland. In the meantime, Minangkabau International Airport suffered damage over the roofs and remained closed for safety reasons (the airport re-opened October 1st, 2009.) Tsunami warning system was issued but was soon repealed. The casualties can be seen in **Figure 1.2.** The damaged and casualties can be seen in **Figure 1.3.**

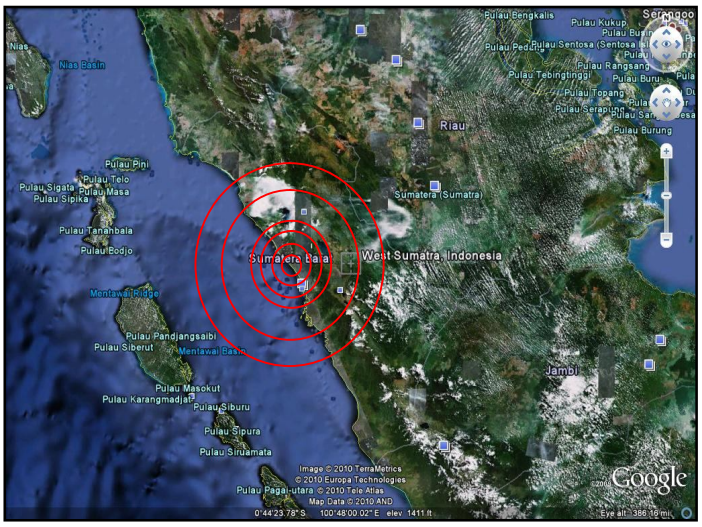
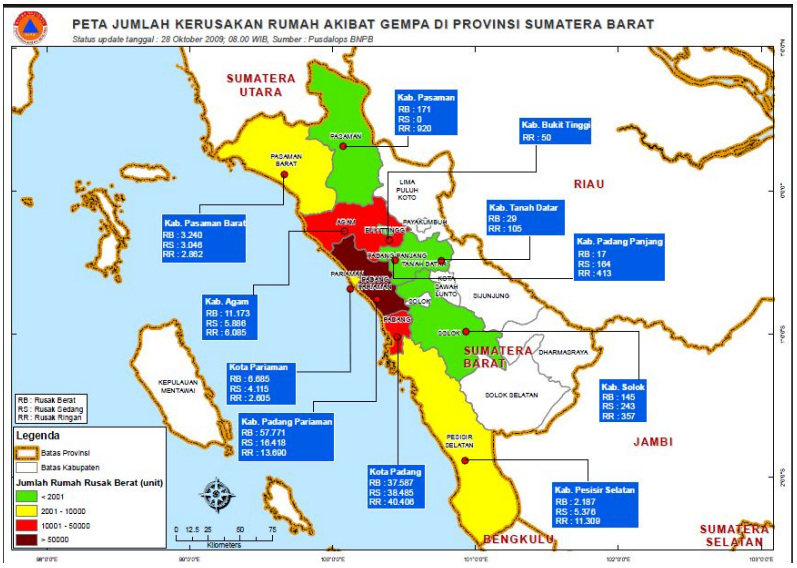


Figure 1.1. Location Map of Earthquake September 30th, 2009

Figure 1.2. Damaged and Casualties Caused by The 30 September 2009 Earthquake



RB: Heavy Damage, **RS:** Medium Damage, **RR:** Light

Figure 1.3. Map of Casualties, September 30th 2009 Post-Earthquake

Number of casualties and damage recorded post-earthquake September 30th, 2009:

Death	: 1.195 Persons	Lightly Damaged Houses	: 67.838 units
Severe Injured	: 619 Persons	Damaged Educational Facilities	: 4.748 units
Slightly Injured	: 1.179 Persons	Damaged Health Facilities	: 153 units
Missing	: 2 Persons	Damaged Places of Worship	: 2.851units
Heavily Damaged Houses	: 114.797 units	Damaged Markets	: 58 units
Moderately Damaged Houses	: 67.198 units	Damaged Bridges	: 68 pieces

2. SEPTEMBER 30th 2009 POST-EARTHQUAKE REHABILITATION AND RECONSTRUCTION PROGRAMS

2.1. Emergency Response

The emergency response period was established for two months right after the earthquake. A total of 130 international organizations from many different countries have given and continue to give humanitarian aids to West Sumatra. After participating in the evacuation and the search for victims, these 130 international organizations began focusing on longer term humanitarian activities such as reconstruction of residential homes, water supply, and supervision of food and nutrition. Actions were taken immediately to speed up rubble clearing, as well as to facilitate the coordination of the emergency response phase.

UN-OSOCC is an agency established by the United Nations to coordinate the activities and presence of all international agencies that came to West Sumatra to help search for the victims. Rescue teams were brought into the country by International agencies, and they were, among others, UNOCHA, IOM, Hope Indonesia, JICA, AusAID, HK Logistics and US Consul General in Medan, other UN agencies. Then, USAID, the European Commission, Mahkota Medical Centre Hospital from Malaysia, IHH Humanitarian Aid Turkey, Church World Service (CWS), Disaster Relief Team Japan and Korea and the United National Insarag Switzerland and from Australia, act. Meanwhile, the UNDAC (United Nations Disaster and Coordination Assessment), an institution under the United Nations, praised the actions of Indonesia in carrying out evacuation in stages during the emergency

2.2. Preparation of Action Plan

In the anticipation for the loss and the need for the recovery funds, various parties such as the central governments' BNPB (the National Agency for Disaster Management), Bappenas (National Development Planning Agency) and local governments cooperating with the University of Andalas to immediately construct the disaster management action plan for 2009 to 2011. As known, post-disaster recovery scenarios have been prepared under the assumption of the resource availability and pre-disaster conditions, especially financial resources coming from the central and local government, as well as the condition before the disaster. Based on these assumptions, efforts were targeted into three scenarios:

- **Scenario I: Excess Financing Resources**
  The recovery efforts were expected to reconstruct the whole region, not only limited to the damaged and lost sectors of the region, but also for the people affected by the earthquake as well**.**

- **Scenario II: Adequate Financing Resources**
  Recovery efforts were expected to exceed the minimum standard of service development, covering all the damaged and lost sectors of the region, and people who were affected by the earthquake.

- **Scenario III: Lack of Financing Resources**
  Recovery efforts were prioritized on housing sectors and minimum standard services, as well as the help stimulating the economic activities. It turned out that the rehabilitation and reconstruction for 30

September 2009 West Sumatra's earthquake was placed under the third scenario due to its lack of financing.

General strategies for West Sumatra post-earthquake recovery were determined by:
1. The social and economic condition and the culture of the community.
2. Environmental sustainability and disaster risk reduction.
3. Benefits and effectiveness of aid for the earthquake victims.
4. The 12 districts that were affected by the West Sumatra earthquake.

Through the National Agency for Disaster Management (BNPB), the central government has formed a rehabilitation and reconstruction Technical Support Team (TPT-RR) to assist the Governor of West Sumatra in implementing rehabilitation and reconstruction (TPT-RR, 2010). The Implementation was systematically carried out and integrated in order to improve facilities and infrastructure. As a result, each sector could be conducted effectively and efficiently in accordance with the applicable regulations. This action plan was developed as a program platform to:
1. Develop mutual understanding and commitment with the central government, provincial government, districts government, businesses, communities, universities, and non-profit organizations to re-establish all the living aspects of the people affected by the natural disaster in West Sumatra.
2. Align all post-earthquake rehabilitation and reconstruction activity planning, designed by the central government, in this case the ministries/agencies, provincial and local government.
3. Conciliation of the central, provincial, and district government's plan with the District Mid Term Development Plan (RPJMD).
4. Combine the post-disaster rehabilitation and reconstruction planning with the annual planning from the central, provincial and district government.
5. Provide clear picture between stakeholders to avoid overlapping when implementing the post-earthquake rehabilitation and reconstruction.

This activity is an integral part of the national development planning system set out in 2004, Act No. 25. Funding for rehabilitation and reconstruction were sourced from the national budget, provincial budget, districts budget, people's charity, and international agencies. Policy of Rehabilitation and Reconstruction action have integrated in the annual planning and budgeting mechanism in the Central Government Work and Budget Plan (RAPBN), as well as the Provincial/Local Government Work and Budget Plan (RAPBD), that are in accordance with the regulations and legislations. Rehabilitation and Reconstruction mechanism can be seen in **Figure 2.1.**

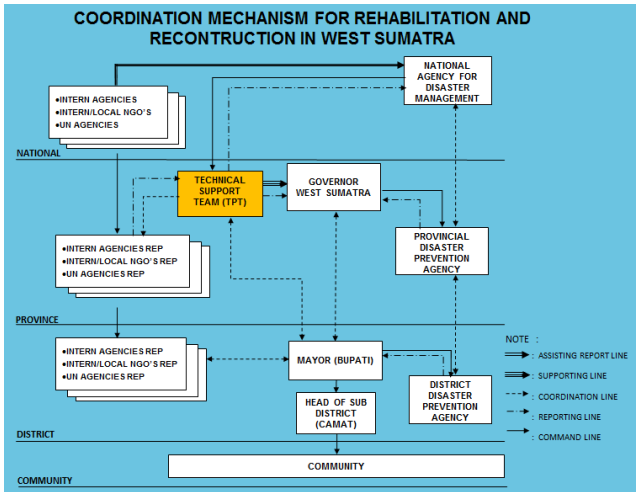


Figure 2.1. Rehabilitation and Reconstruction Mechanism of West Sumatra.

3. PERFORMANCE OF SEPTEMBER 30th, 2009 POST-EARTHQUAKE REHABILITATION AND RECONSTRUCTION IMPLEMENTATION IN WEST SUMATRA

The rehabilitation and reconstruction (RR) activities of 30 September 2009 post-earthquake in West Sumatra Province were implemented in several phases. Phase 1, (pilot project) the program covered 4 (four) sectors, namely Housing Sector, Infrastructure Sector, Government Buildings Sector, and other Sectors (cross-sectored programs); Social Sector, and Productive Economic Sector and other facilitation programs and technical assistance to support of community empowerment and institutional operation. Total budget provided was IDR 313,933,950,000.- , which was financed by National State Budget (APBN) of BNPB for 4 (four) main sectors. This budget allocated at the end of Fiscal Year 2009; so that the budget of this first phase was transferred to Special Account of West Sumatra Provincial Budget (APBD) and will use in the Fiscal Year of 2010. The percentage of allocated budget for each respective sector is presented in **Figure 3.1**

In the pilot project phase I, the Government through the National Agency for Disaster Management or BNPB has prepared a social grant program in the form of Direct Community Grant Aid or BLM with a total allocated budget of IDR 114,540,000,000.- for the rehabilitation and reconstruction of houses that were heavily and moderately damaged totaling 7,636 units. Whereas, those houses that were slightly damaged totaling 67,838 units become the responsibility of the sub-province and municipal government (BAPPENAS 2009). The implementation of rehabilitation and reconstruction program of 30 September 2009 post-earthquake in West Sumatra Province covered 12 districts (Kabupaten/Kota), with the City of Padang and Padang Pariaman district, the most severely affected areas. The breakdown of the damage presented in **Table 3.1.**

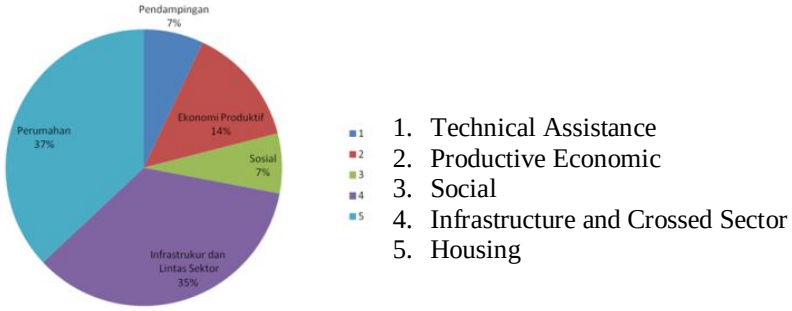


Figure 3.1. Percentage of Allocated Budget for Phase I for Each Respective Sector

Table 3.1. Houses Damaged Due to 30 September 2009 West Sumatra Earthquake

NO	CITY / DISTRICT	DAMAGED			Total
		Heavily	Moderately	Ligtly	
1	Padang City	33.597	35.816	37.615	107.028
2	Padang Pariaman District	57.931	16.291	12.945	87.167
3	Pariaman City	6.685	4.115	2.605	13.405
4	Agam District	11.796	3.797	4.353	19.946
5	Pesisir Selatan District	1.156	3.596	5.510	10.262
6	Solok District	145	243	357	745
7	Kepulauan Mentawai District	3	0	136	139
8	Pasaman Barat District	3.240	3.046	2.862	9.148
9	Pasaman District	197	13	931	1.141
10	Padang Panjang District	17	164	413	594
11	Solok City	2	2	6	10
12	Tanah Datar District	28	115	105	248
Total		**114.797**	**67.198**	**67.838**	**249.833**

3.1. Phase I (Pilot Project) Housing Rehabilitation And Reconstruction

Based on the agreement achieved by the governor and the Head of Districts and mayors of 12 districts (Kabupaten/Kota) that took place on January 17, 2010, the implementation of phase I was to be carried out as a pilot project for those districts having more than 300 houses that are totally and severely damaged. Based on the criteria described, the locations selected as the target for phase I housing rehabilitation and reconstruction program were located in 7 (seven) districts; Padang City, Padang Pariaman districts, Agam district,Pesisir Selatan district, West Pasaman district, Pariaman City, and Solok district. The total budget of IDR 114,540,000,000.- was allocated for food stuffs totaling IDR 6,949,560,000.- and family kit at IDR 305,440,000.-. In phase I, at least 177 community empowerment facilitators and 155 technical facilitators were recruited to support the implementation of rehabilitation and reconstruction program. The Team of Facilitators or TPM and facilitators then carried out recollection and validation of data by using the assessment criteria of damaged houses in accordance with the Technical Guideline for Earthquake Resistant Housing and Building. When the validation was completed, a difference in the number of heavily and moderately damaged houses was discovered. This was due to different perception in determining the Damaged Housing Assessment. The planned distribution of rehabilitation and reconstruction of damaged people housing is presented in **Table 3.2.** The result of validation on damaged houses by the earthquake in phase I is presented in **Table 3.3.**

3.2. Phase II Housing Rehabilitation And Reconstruction

Phase II rehabilitation and reconstruction works were prioritized for housing sector. Learning from the implementation of pilot project phase I, a number of improvements were carried out for phase II rehabilitation and reconstruction program among which are the simplification of BLM funding process, establishment of more effective financial institutions, and training program for facilitators. In phase II, fund allocated was sum-up to IDR 2 trillion which was prioritized for rehabilitation and reconstruction of houses totaling 137,000 units and facilitation of housing rehabilitation activities and institutional capacity building.

In phase II, the procedure for disbursement of grant fund was different from that of phase I, where the funding for operational activities and facilitation were directly managed by the KPA (the Authorization for Budget Users) BNPB and PPK (BNPB through the procedure under the BNPB State Budget). The Provincial PPK received transfer of fund from BNPB through special account of provincial PPK (the Implementation Officer). As in phase I after validation was conducted, there were discrepancies in the number of heavily and moderately damaged houses. The result of validation (verification) is shown in **Table 3.4**, **Table 3.5**, and **Table 3.6.**

3.3. The distribution of the Rehabilitation and Reconstruction Fund

Application for fund disbursement for each phase was submitted by districts (Kabupaten/Kota) PJOK (Operational Coordinator Official) in accordance with the standing instruction letter for disbursement from the Central PPK to the Implementing Bank (BRI). The fund for housing rehabilitation and reconstruction was directly paid to the Pokmas (Community Group) account. Data validation was done by Facilitators together with TPM (Community Assistance Team), after the opening of an account at the BRI Bank (as stipulated in the MOU) for each respective Pokmas. Thereafter, the data and Pokmas' account were sent to the PPK BNPB Jakarta through Kabupaten/Municipal PJOK and Provincial PJOK after the data is verified by the PPK BNPB in Jakarta and then submitted to KPKN Jakarta After the data met the requirements, thereafter the fund was channeled through the BRI Bank and transferred directly to the account of each respective Pokmas without any deduction.The percentage of allocation of fund is shown in **Figure 3.4.**

Table 3.2. Planned Distribution of People Housing Rehabilitation and Reconstruction

City / District	Damaged Houses			Pilot Project (Phase I)			Plan (Phase II)			Damaged Houses Remaining		
	Heavily	Mode-rately	Total	Heavily	Mode-rately	Total	Heavily	Mode-rately	Total	Heavily	Mode-rately	Total
Padang City	33.597	35.816	69.413	1.700	500	2.200	23.243	20.966	44.209	6.654	16.913	23.567
Padang Pariaman District	57.931	16.291	74.222	3.000	575	3.575	38.134	15.633	53.767	16.797	83	16.880
Pariaman City	6.685	4.115	10.800	360	90	450	6.325	4.025	10.350	0	0	0
Agam District	11.796	3.797	15.593	650	75	725	11.146	3.722	14.868	0	0	0
Pesisir Selatan District	1.156	3.596	4.752	100	75	175	1.056	3.521	4.577	0	0	0
Solok District	145	243	388	100	36	136	45	207	252	0	0	0
Pasaman Barat District	3.240	3.046	6.286	170	50	220	3.070	2.996	6.066	0	0	0
Pasaman District	197	13	210	10	13	23	201	459	660	0	0	0
Padang Panjang District	17	164	181	17	20	37	10	100	110	0	0	0
Tanah Datar District	28	115	143	10	15	25	28	114	142	0	0	0
Total	**114.792**	**67.196**	**181.988**	**6.117**	**1.449**	**7.566**	**83.258**	**51.743**	**135.001**	**23.451**	**16.996**	**40.447**

Table 3.3. Validation Result of Damaged Houses Phase I (Pilot Project)

No	City / District	Initial Data			Validation Result			Difference		
		Heavily	Mode-rately	Pokmas	Heavily	Mode-rately	Pokmas	Heavily	Mode-rately	Pokmas
1	Padang City	1.733	500	89	1.389	732	86	-311	232	-3
2	Padang Pariaman District	3.051	575	145	2.828	541	139	-182	-34	-6
3	Pariaman City	366	90	19	199	153	15	-161	63	-4
4	Agam District	656	75	29	350	261	26	-300	186	-3
5	Pesisir Selatan District	106	75	7	91	78	9	-15	3	2
6	Solok District	125	36	6	75	50	9	-50	14	3
7	Pasaman Barat District	196	50	12	196	50	16	0	0	4
Total		**6.233**	**1.401**	**307**	**5.118**	**1.865**	**300**	**-1.115**	**464**	**7**
		7.634		**-**	**6.983**		**-**	**651**		**-**

Table 3.4. Data Validation Result of Damaged Houses Phase IIA

No	City / District	Initial Data			Validation Result			Total of Pokmas
		Heavily	Moderately	Total	Heavily	Moderately	Total	
1	Padang City	5.103	5.440	10.543	4.221	6.837	11.058	457
2	Padang Pariaman District	7.919	2.474	10.393	7.636	2.682	10.318	437
3	Pariaman City	1.015	187	1.202	839	449	1.288	54
Total		**14.037**	**8.101**	**22.138**	**5.118**	**9.968**	**22.664**	**948**

Table 3.5. Data Validation Result of Damaged Houses Phase IIB

No	City/ District	Initial Data			Initial Data Revision I			Validation Result			Total of Pokmas
		Heavily	Modera-Tely	Total	Heavily	Modera-tely	Total	Heavily	Modera-tely	Total	
1	Padang City	12,460	13,892	26,352	20,140	15,526	35,666	12,0333	30,801	42,834	1,715
2	Padang Pariaman District	30,215	13,159	43,374	30,215	13,159	43,374	30,540	12,965	43,505	1,795
3	Pariaman City	2,469	2,469	4,938	5,130	3,838	9,148	5,130	4,679	9,989	432
4	Agam District	11,146	3,722	14,868	11,146	3,722	14,868	8,094	6,535	14,629	626
5	Pesisir Selatan District	1,056	3,521	4,577	1,056	3,521	4,577	658	3,224	3,882	194
6	Solok District	45	207	252	45	207	252	39	216	255	16
7	Pasaman Barat District	3,070	2,966	6,066	3,070	2,996	6,066	2,188	3,110	5,228	226
8	Pasaman District	187	0	187	201	459	660	159	387	546	25
9	Padang Panjang City	0	144	144	10	100	110	12	100	112	6
10	Tanah Datar District	18	100	118	28	144	142	28	114	142	13
Total		**60,666**	**40,210**	**100,876**	**71,221**	**43,642**	**114,863**	**58,985**	**62,140**	**121,125**	**5,048**

Table 3.6. Total Data Validation Result of Damaged Housing Phase II (Phase IIA and Phase IIB)

No	City/ District	Revision Of Quota Phase II A And B				Validation Result			
		Heavily	Moderately	Total	Estimate Pokmas	Heavily	Moderately	Total	Total Pokmas
1	Padang City	25,243	20,966	46,209	1,849	16,254	37,638	53,892	2,172
2	Padang Pariaman District	38,134	15,633	53,767	2,151	38,176	15,647	53,826	2,232
3	Pariaman City	6,325	4,025	10,350	414	6,149	5,128	11,277	486
4	Agam District	11,146	3,722	14,868	595	8,094	6,535	14,629	626
5	Pesisir Selatan District	1,056	3,521	4,577	183	658	3,244	3,882	194
6	Solok District	45	207	252	10	39	216	255	16
7	Pasaman Barat District	3,070	2,996	6,066	243	2,118	3,110	5,228	226
8	Pasaman District	201	459	660	26	159	387	546	25
9	Padang Panjang City	10	100	110	4	12	100	110	6
10	Tanah Datar District	28	114	142	6	28	114	142	13
Total		**85,528**	**51,743**	**137,001**	**5,481**	**71,681**	**72,108**	**143,789**	**5,996**

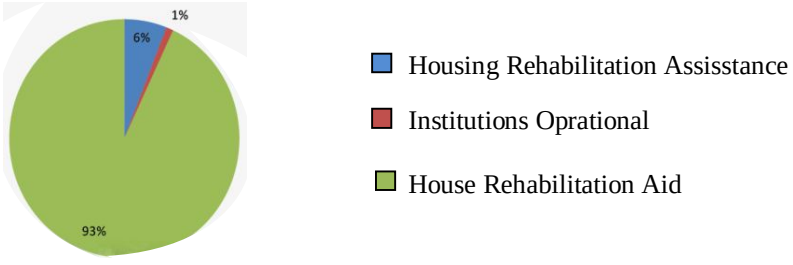


Figure 3.4. Percentage Allocation of Fund Phase II in Each Respective Sector

4. BUILDING BACK BETTER

Post-earthquake rehabilitation and reconstruction's motto building backbetter covers general and operational policies for the implementation of the people housing rehabilitation and reconstruction and the

construction of the government buildings. General policy contains earthquake resistant development approach strategy and sustainable development with technological outlook. While operational policy comprises procedure on earthquake resistant buildings. General policy comprises:

4.1. Enhancing People Concern and Behavior Awareness of Disaster in Daily Life.

West Sumatra is located in a disaster-alert area. This means that the people in West Sumatra people are exposed to disaster-alert situation. With this regard, the concern that needs to be taken is as follows:
a. Recognizing and reviewing the likely threat of disaster and its mitigation
b. Understanding the environmental condition and situation and people vulnerability
c. Analyzing the feasible impact of disaster
d. Action alternative to reduce the disaster risk;
e. Being prepared to manage the disaster threat and its impact

4.2. Complying to Laws and Regulations

In undertaking government or individual/private building construction, prevailing national and regional laws and regulations that regulate construction of earthquake resistant building must be complied. Regional Spatial Plan becomes a reference for utility control of regional spatial plan. Utility control of space comprises application of regulations related to spatial planning, safety standards, and application of sanctionson violation of use. The District/City Spatial Plan, especially in West Sumatra Province, of course still needs to be updated so that it enacts as Local regulation in a respective region, hence, it calls for preparation of zoning map in the district/ cities that are earthquake prone. The zoning map could become a local guideline regarding which areas are still safe as location for development and what areas are not permitted for development location. Furthermore, application of sanction in land use control needs to be enforced, particularly in new building construction that are earthquake resistant

4.3. Enhancing the Facilitation and Technical Guidance Activity

Facilitation regarding strengthening human resources capacity building in the province and district/city needs to be conducted. This can be done to prepare the regulations, implementation and facilitation guideline for the project manager. Extension and dissemination of regulations and technical manuals for earthquake resistant house need to be conducted. Application of building permit (IMB), particularly for constructing new building is an absolute requirement that must be enforced. In addition, introduction of Building Permit in the rehabilitation and reconstruction of people housing could be conducted. Information dissemination on earthquake resistant building through printed and electronic media is also important.

4.4. Operational Policy

Operational policy is determined to realize targets and sub-target of rehabilitation and reconstruction program. The implementation of rehabilitation and reconstruction is also determined based on the chosen rehabilitation and reconstruction activity scenario and can anticipate a variety of issues and developing environment. Operational policy comprises as follows:
- Restoring the function of building, housing, infrastructure, and basic services that are environmentally friendly or earthquake resistant;
- Providing knowledge on hazard knowledge and risk knowledge;
- Commitment from policy maker both at central and regional levels;
- Preparation of law and regulations (legislation) to support smooth implementation of rehabilitation and reconstruction process;
- Damage and loss preliminary need assessment or DALA;

• Make building code;
• Help people by giving design;
• Determination of economic infrastructure building location in accordance with the land use;
• Recruitment of facilitators and Community assistance Team;
• Provide house repair stimulus fund that is implemented through community empowerment;
• Supervision of housing rehabilitation and reconstruction work and construction of infrastructure and facilities

4.5. The Main Requirements for Earthquake Resistant-Housing

The main requirement for the house construction is that the construction should meet the following standard and requirements (Boen, 2009 and CDSR 2010):
1. Good quality of building materials;
2. Appropriate site and structure dimension
3. All elements of main structure are well connected
4. Good workmanship

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