No.

Ministry of Housing, Construction
and Sanitation (MVCS)
Republic of Peru

The Study
on
Housing Reconstruction with Seismic-resistant Houses
in
the Republic of Peru

Final Report

Annex 1

May 2009

JAPAN INTERNATIONAL COOPERATION AGENCY

ORIENTAL CONSULTANTS CO., LTD.

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The exchange rate applied in the Study is:

JPY 1.00 = S/0.0318
US $ 1.00 = S/3.0334

(December, 2008)

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LIST OF ABBREVIATIONS

ADRA	The Adventist Development and Relief Agency
APCI	Peruvian International Cooperation Agency
BANMAT	Bank of Materials
BFH	Family Housing Bonus
B/Q	Bill of Quantities
CARE	The Cooperative for American Remittance to Europe
CAPECO	Peruvian Chamber of Construction
CISMID	Japan-Peru Center for Earthquake Engineering and Disaster Mitigation
CMPAD	Multi-sectoral Commission for Disaster Prevention and Response
COE	Emergency Operation Center
COFOPRI	Commission for the Formalization of Informal Property
ESTABS	Extended Tri-Dimension Analysis for Building Structures
FORSUR	Fund for the Reconstruction of the South
FONCODES	National Cooperation Fund for Social Development
GDP	Gross Domestic Product
IGP	Geophysics Institute of Peru
IHD	Human Development Index
INDECI	National Institute of Civil Defense
IMP	Metropolitan Institute of Planning
INEI	National Institute of Statistics and Information
ISC	Superior Institute of the Construction
ITDG	The Intermediate Technology Development Group
JICA	Japan International Cooperation Agency
MMI	Modified Mercalli Intensity
MVCS	Ministry of Housing, Construction and Sanitation
NGO	Non-Governmental Organization
PCM	Presidency of the Ministry Council
PRA	Participatory Rural Appraisal
RUCP	Pontifical Catholic University of Peru
RC	Reinforced Concrete
SEDAPAL	Lima Water and Sewer Company
SENCICO	National Training Service in Construction PERU
SINADECI	National System of Civil Defense
SUNARP	National Superintendency of Public Registration
SNIP	National System of Public Investment
TUPA	Exclusive Text for Administrative Procedures
UN	United Nations
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund

VOLUME 1

Building Survey

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CHAPTER 1 BACKGROUND AND OBJECTIVES OF THE BUILDING SURVEY FOR 33 DISTRICT MUNICIPALITIES

A big earthquake on 15th of August 2007 mainly damaged the coast of Ica Region and produced many victims and material damages. According to the INEI 52,134 houses collapsed as a consequence of this earthquake.

INEI and INDECI conducted surveys on damages by the earthquake. Since the survey results were not available to the JICA Study Team, the Team conducted its own building survey for 33 district municipalities as the target areas of the Study.

The building survey aimed at clarifying the extent of the housing damage and the progress of housing reconstruction after the earthquake.

CHAPTER 2 METHODOLOGY OF THE SURVEY

2.1. Survey Area

The survey areas are the 33 district municipalities located in three provinces dispersed over the Ica region: Chincha, Pisco and Ica.

2.2. Methodology by Stage

2.2.1. Preparation Stage

(1) Preparation of Questionnaire

A questionnaire was prepared to carry out the damage survey. This questionnaire consisted of three sections as follows.

The first section was data collection: a) housing conditions before the earthquake, b) housing damage conditions by the earthquake, c) housing damage according to building structure, d) housing reconstruction progress, e) socio-economic conditions and natural conditions.

The second section has interviews with the municipality officials, on capacity development assistance of housing construction, building permit and issues of housing reconstruction to be resolved and proposals for dealing with the issues in the districts. Interview topics also included their opinions on ideal program to facilitate reconstruction of safer housing against earthquakes.

The third section is observation and analysis of house construction with confined masonry or adobe at construction site.

The Major items of questionnaire for the building survey are as follows.

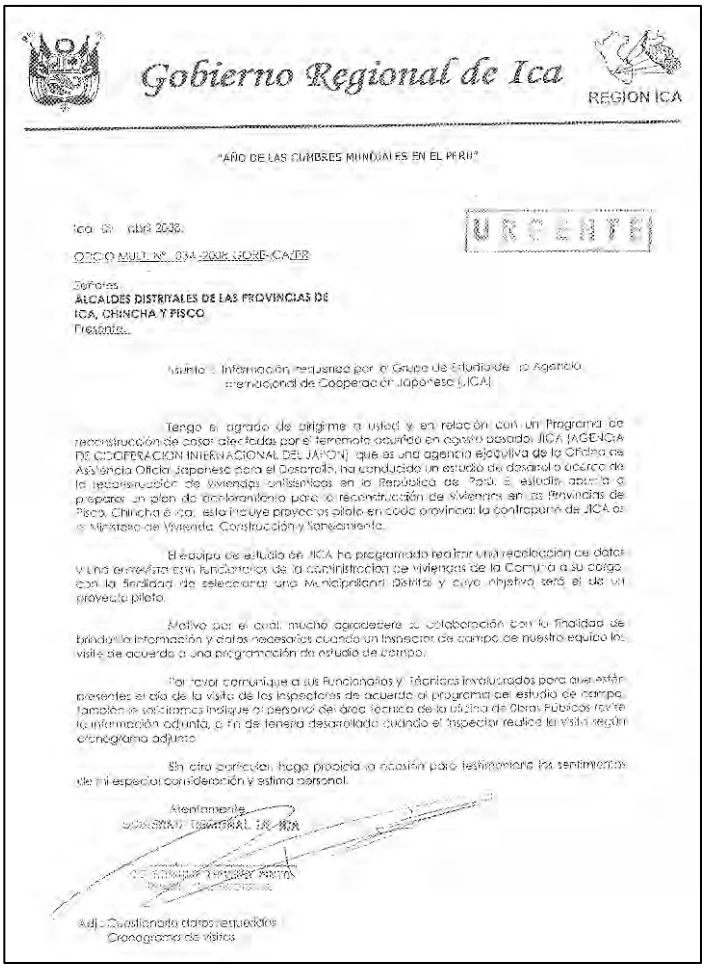
1. DATA COLLECTION
   - *1.1 Housing conditions before the earthquake*
   - *1.2 Housing damage conditions by the earthquake*
   - *1.3 House damage according to building structure*
   - *1.4 Housing reconstruction progress*
   - *1.5 Socio-economic conditions*
   - *1.6 Natural conditions*
2. INTERVIEWS WITH ADMINISTRATION OFFICIALS
   - *2.1 Capacity development assistance of housing construction*
   - *2.2 Building permit*
   - *2.3 Issues of housing reconstruction to be resolved and proposals for dealing with the issues in your district*
   - *2.4 Prioritization of ideal programs to facilitate a reconstruction of seismic resistant houses*
3. OBSERVATION AND ANALYSIS OF HOUSE CONSTRUCTION AT SITE
   - *3.1 Collapsed house*
   - *3.2 Confined masonry or adobe house reconstruction*

(2) Preparation of a Survey Guide

A guide of how to carry out the survey in the 33 district municipalities was prepared for the surveyors. This guide includes a flow chart of the field survey, methodology and schedule of the survey.

(3) Previous Notice of the Survey

The JICA Study Team requested Ica regional government to make advanced notice of the survey to the 33 district municipality mayors. In response to the request, the Ica regional government sent the 33 district municipality mayors an official letter on a cooperation request to the building survey conducted by the JICA Study Team (see letter below). The JICA Study Team also directly contacted with all the mayors about the survey schedule.



Gobierno Regional de Ica

REGION ICA

"AÑO DE LAS CUMBRES MUNDIALES EN EL PERU"

Ica, 01 abril 2008.

URGENTE

OFICIO MULTI N° 034-2008-GOREICA/PR

Señores
ALCALDES DISTRITALES DE LAS PROVINCIAS DE
ICA, CHINCHA Y PISCO
Presente.-

Asunto : Información requerida por el Grupo de Estudio de la Agencia Internacional de Cooperación Japonesa (JICA)

Tengo el agrado de dirigirme a usted y en relación con un Programa de reconstrucción de casas afectadas por el terremoto ocurrido en agosto pasado, JICA [AGENCIA DE COOPERACION INTERNACIONAL DEL JAPON], que es una agencia ejecutiva de la Chidna de Asistencia Oficial Japonesa para el Desarrollo, ha conducido un estudio de desarrollo acerca de la reconstrucción de viviendas antisísmicas en la República del Perú, el estudio apunta a preparar un plan de fortalecimiento para la reconstrucción de viviendas en las Provincias de Pisco, Chincha e Ica, este incluye proyectos pilotos en cada provincia; la contraparte de JICA es el Ministerio de Vivienda, Construcción y Saneamiento.

El equipo de estudio de JICA ha programado realizar una recolección de datos y una encuesta con funcionarios de la administración de viviendas de la Comuna a su cargo, con la finalidad de seleccionar una Municipalidad distrital y cuyo objetivo será el de un proyecto piloto.

Motivo por el cual, mucho agradeceré su colaboración con la finalidad de brindarle la información y datos necesarios cuando un inspector de campo de nuestra equipo los visite de acuerdo a una programación de estudio de campo.

Por favor comunique a sus Funcionarios y Técnicos involucrados para que estén presentes el día de la visita de los inspectores de acuerdo al programa del estudio de campo, también le solicitamos indique al personal del área técnica de la oficina de Obras Públicas llenar la información adjunta, a fin de tenerla desarrollada cuando el inspector realice la visita según cronograma adjunto.

Sin otro particular, hago propicia la ocasión para testimoniarle los sentimientos de mi especial consideración y estima personal.

Atentamente,

Adj.: Cuestionario datos requeridos
Cronograma de visitas

Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

Figure 2.2.1 Official Letter from the President of Ica Regional Government to the Mayors of the 33 District Municipalities

2.2.2. Implementation Stage

Three engineers were dispatched to the 33 district municipalities in order to carry out the field survey. The data collection and interview surveys were made at the public works section of each district municipality. The construction sites for observation survey were introduced by the public works section of each municipality. The collected information and data were input into the survey tabulation after the survey was finished every day and sent to office of the JICA Study Team.

CHAPTER 3 SCHEDULE

Work schedule of implementation stage is shown below.

Table 3.1 Work Schedule of the Building Survey

FIELD SURVEY SCHEDULE

Japan International Cooperation Agency (JICA) **Period of Work: April 14th – April 28th**

			Surveyors	Daniel Luyo	Willy Hugo	Edgar Escalante
Day	Date		Provinces	CHINCHA	ICA	PISCO
1	Mon	14	One way trip	Trip from Lima to field site. Reconnaissance of site		
2	Tue	15	First visit to the District municipalities	Chavin, Sn Pedro	Santiago, Yauca	Huancano, Humay
3	Wed	16		Sn Juan, Alto Laran, El Carmen	Ocucaje, Pachacutec, Tate	*Sn Jose, Sn Juan, Salas Gdlupe*
4	Thur	17		Chincha Baja, Tambo de Mora, Sunampe	Ica, Pueblo Nuevo, Los Aquijes	Paracas, Sn Andres, Tupac Amaru
5	Fri	18		Chincha Alta, Pueblo Nuevo, Grocio Prado	Parcona, La Tinguiña, Subtanjalla	Pisco, Independencia, Sn Clemente
6	Sat	19	First visit to the construction sites	Observations in construction sites		
7	Sun	20				
8	Mon	21	Second visit to the District municipalities	Chavin, Sn Pedro	Santiago, Yauca	Huancano, Humay
9	Tue	22		Sn Juan, Alto Laran	Ocucaje, Pachacutec	*Sn Jose, Sn Juan*
10	Wed	23		El Carmen, Chincha Baja	Tate, Ica	*Salas*, Paracas
11	Thur	24		Tambo de Mora, Sunampe	Pueblo Nuevo, Los Aquijes	Sn Andres, Tupac Amaru
12	Fri	25		Chincha Alta, Pueblo Nuevo, Grocio Prado	Parcona, La Tinguiña, Subtanjalla	Pisco, Independencia, Sn Clemente
13	Sat	26	Second visit to the construction sites	Observations in construction sites		
14	Sun	27				
15	Mon	28	Return trip	Trip from field site to Lima		

Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

CHAPTER 4 SUMMARY OF THE SURVEY RESULTS

4.1. Survey Results

4.1.1. Type of Building Structure of Housing

(1) Type of Housing Structure

Sun-dried brick (adobe) house and confined masonry houses are major housing types in the 33 districts. The rest types such as reinforced concrete house, only masonry without concrete frame house, and cane and mud (quincha) house have lower percentages.

(2) Number of Houses by Structure Type before the Earthquake by District

Some districts, namely San Juan de Yanac and San Pedro de Huacarpana in Chincha and Yauca del Rosario in Ica, had no reinforced concrete, confined masonry and only masonry without concrete frame houses before the earthquake.

4.1.2. Damage Level of Housing by the Earthquake

(1) Damage Level of Housing

Thirty one percent (31%) of the houses of the 33 districts were collapsed and heavily damaged. The rest of the houses were classified into uninhabitable houses to be demolished (22%), houses to be repaired (23%), and houses without damage (24%).

(2) Damage Level of Housing by District

Some districts classifies house damage in two categories only: any houses to be repaired or houses without damage. These districts are El Carmen, Pueblo Nuevo, San Juan de Yanac and Sunampe in Chincha; La Tinguiña, Los Aquijes, Pueblo Nuevo, Salas Guadalupe and Yauca del Rosario in Ica; and Huancano, Humay, Tupac Amaru Inca and Paracas.

(3) Damage Level of Reinforced Concrete House

Majority of houses with reinforced concrete (71%) were without damage.

(4) Damage Level of Confined Masonry House

Majority of houses with confined masonry (65%) were without damage.

(5) Damage Level of only Masonry without Concrete Frame House

Majority of houses of only masonry without Concrete Frame were corresponded to the houses to be repaired (36%) and houses collapsed and heavily damaged (34%).

(6) Damage Level of Sun-dried Brick (adobe) House

Majority of houses with sun-dried brick (adobe) were Houses collapsed and heavily damaged (61%).

4.1.3. Progress of Housing Reconstruction

(1) Housing Reconstruction Progress by District

The number of beneficiaries listed in BONO 6000 are 67,622 in the 33 districts.

(2) Building Permit by District

In the majority of the municipalities, there are insufficient number of personnel in charge of building permit administration (evaluation and inspection of construction after delivering of the building permit). Only 6,433 houses applied for building permit.

(3) Issues of Housing Reconstruction by District

The principal constraints to facilitate the reconstruction of housing are the lack of money of affected people, high prices of materials, the lack of land titles, etc.

4.1.4. Implementation of Training for Reconstruction

(1) Capacity Development Assistance of Housing Construction by District

Training on housing construction was carried out in 11 districts and one on housing administration in 7 districts.

4.1.5. Construction Level of Housing Reconstruction

(1) Critical Points of Adobe House by District

The common construction in Adobe doesn't have any reinforcement. Also, it's common to use inappropriate RC elements in Adobe structures.

(2) Conditions of Adobe House Reconstruction by District

Typical configuration of Adobe constructions: depth and width of foundation (50 cm and 40 cm); not tamped; bad joint between foundation and wall; bad connection between foundation and wall; adobe thickness (30 cm); not availability of vertical reinforcement; inappropriate anchorage of corner; roofing of mud; inappropriate electrical and sanitary installations and no reinforcement in the structure.

(3) Critical Points of Confined Masonry House by District

The critical points as safer housing are the lack of confinement elements in the structures; presence of honey combs in RC elements; bad connections between wall and RC elements,

use of poor concrete (inadequate mixing ossification); lack of technical supervising of constructions and bad quality of materials.

(4) Conditions of Confined Masonry House Reconstruction by District

Typical configuration of confined masonry constructions: depth and width of foundation (90 cm and 55 cm); tamped; good joint between foundation and wall; good connection between foundation and wall; adobe thickness (30 cm) and no availability of bracings in the structure.

4.2. Application of the Survey Results to Formulation of the Pilot Projects

4.2.1. Selection of Pilot Project Area

The site selection of the pilot projects was based on population density (number of persons per sq.km), number of collapsed houses (excluding partially damaged houses) and the interest shown by authorities and technical staff of municipality (the surveyors evaluated the responses of the municipality).

4.2.2. Selection of Pilot Project Components

JICA Study Team prepared “Ideal programs to facilitate the reconstruction of safer housing” in order to know district municipality’s intention about pilot project. The result of prioritization was useful information of formulating project components.

The three most ranked ideas of the fourteen were:

1. Prototype drawings (several types) of seismic resistant houses for the purpose of easy approval of building permit.
2. Manual of construction method of seismic resistant houses for the purpose of easy inspection by house owners applying self construction.
3. Constructing a model house with direct intervention of people so that they can learn and practice the technical procedures to build an adequate building.

These ideas were the base of the pilot projects implemented in the area.

CHAPTER 5 TABLES AND FIGURES

Types of Housing Building Structure

Table 5.1 Type of Housing Structure

unit: house, (%)

(1)Reinforced Concrete (Concreto armado) house	(2)Confined Masonry (Albanieria confinada) house	(3)Only Masonry without Concrete Frame (Albanileria) house	(4)Sun-Dried Brick (Adobe) house	(5)Cane and Mud (Quincha) house	Total
3,371 (1.7)	73,639 (37.6)	18,887 (9.6)	91,262 (46.6)	8,881 (4.5)	196,040 (100)

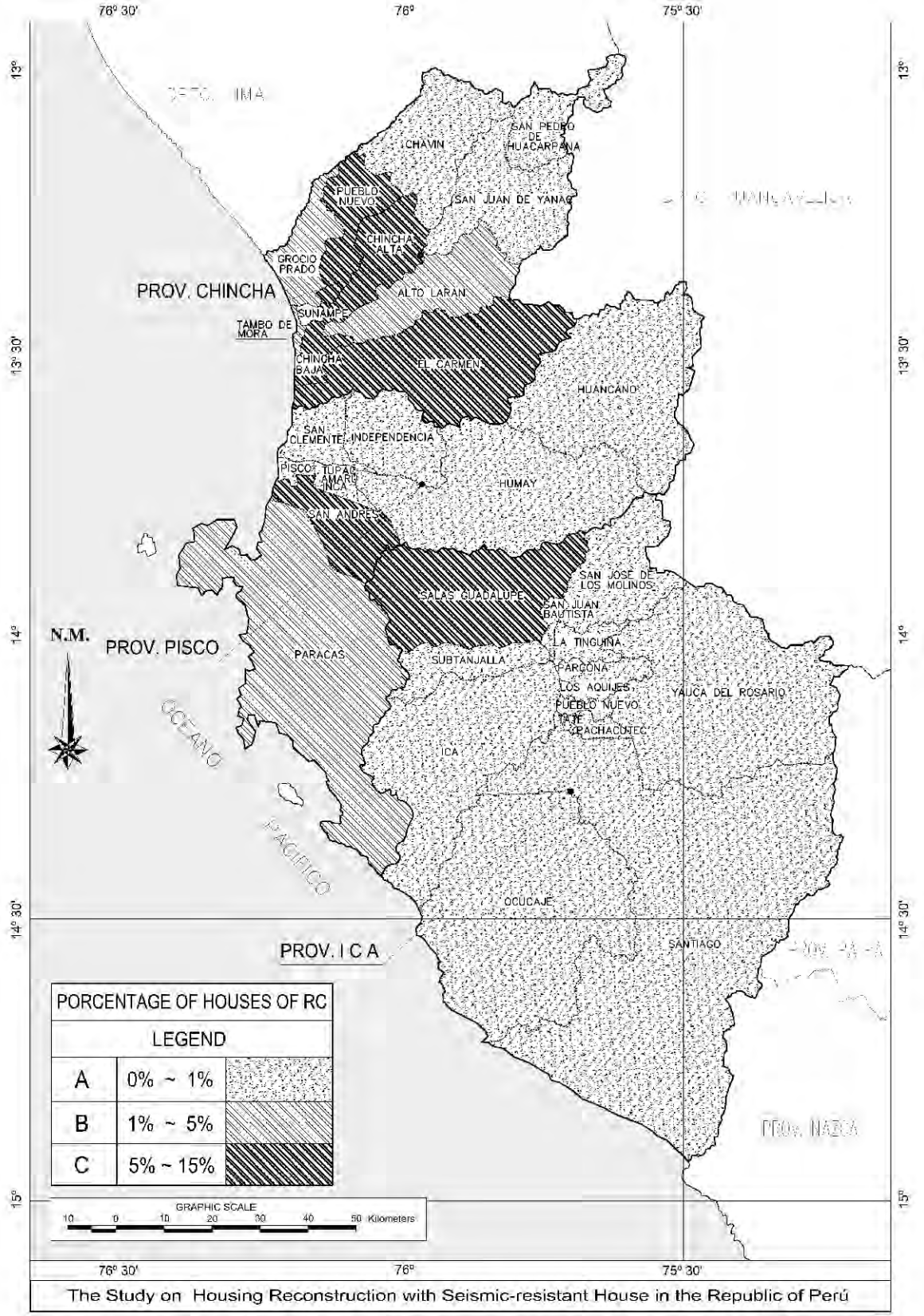
Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Table 5.2 Number of Houses by Structure Type before the Earthquake by District

unit: house

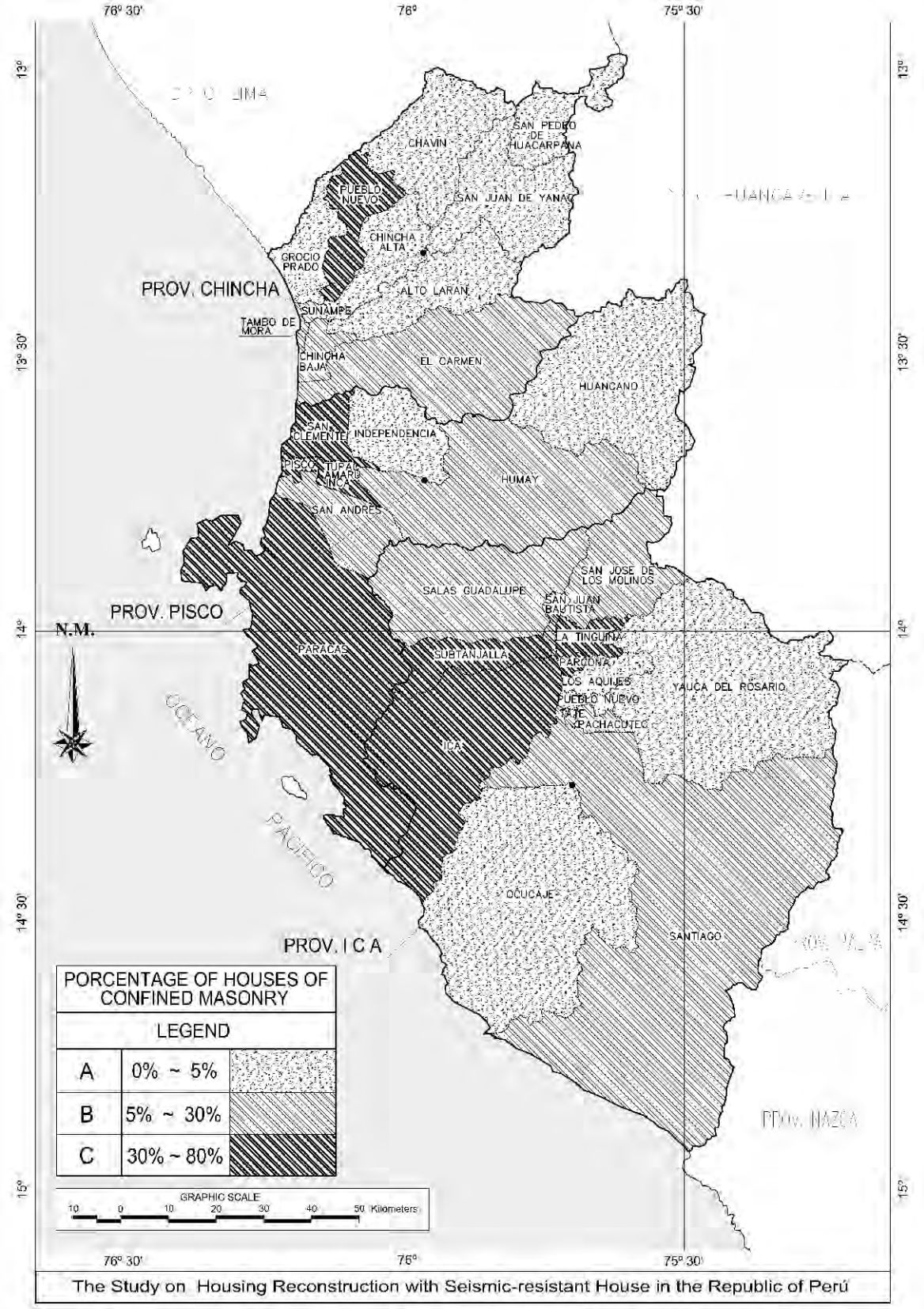
Province	No.	District	a) Total number of houses	b) Reinforced concrete (Concreto armado) houses in total	c) Confined masonry (Albanieria confinada) houses in total	d) Only masonry without concrete frame (Albanileria) houses in total	e) Sun-dried brick (Adobe) houses in total	f) Cane and mud (Quincha) houses in total
			house	house	house	house	house	house
Chincha	1	Alto Laran	7,830	149	180	2,498	3,500	1,503
	2	Chavin	687	0	0	0	639	48
	3	Chincha Alta	19,632	1,080	491	393	17,177	491
	4	Chincha Baja	2,500	250	150	150	1,900	50
	5	El Carmen	2,511	251	126	126	1757	251
	6	Grocio Prado	5,025	125	125	0	4,523	252
	7	Pueblo Nuevo	11,948	597	3,584	1,195	5975	597
	8	San Juan de Yanac	480	0	0	0	384	96
	9	San Pedro de Huacarpana	950	0	0	0	950	0
	10	Sunampe	6,630	0	1,193	331	4,973	133
	11	Tambo de Mora	1,400	14	70	420	826	70
Ica	1	Ica	50,000	0	40,000	2,500	7,500	0
	2	La Tinguina	7,941	0	4,074	1,628	2,033	206
	3	Los Aquijes	3,120	0	13	480	2,377	250
	4	Ocucaje	1,120	0	22	112	202	784
	5	Pachacutec	1,400	0	280	60	1,010	50
	6	Parcona	11,700	0	3,510	1,170	7,020	0
	7	Pueblo Nuevo	1,367	0	21	0	1,159	187
	8	Salas Guadalupe	3,932	275	354	118	2,949	236
	9	San jose de los de Molinos	1,826	0	182	182	1,280	182
	10	San Juan Bautista	3,709	0	556	1,113	1,855	185
	11	Santiago	6,000	0	1,500	300	3,900	300
	12	Subtanjalla	3,651	0	1,095	0	2,228	328
	13	Tate	1,200	0	120	120	900	60
	14	Yauca del Rosario	737	0	0	0	737	0
Pisco	1	Huancano	538	0	0	2	536	0
	2	Humay	1,688	0	84	68	1,452	84
	3	Independencia	3,500	0	70	280	2,100	1,050
	4	San Andres	3,933	590	708	1,573	747	315
	5	San Clemente	4,075	0	1,222	1,222	1,386	245
	6	Tupac Amaru Inca	3,110	0	1,244	1,151	622	93
	7	Paracas	1,900	38	665	95	665	437
	8	Pisco	20,000	2	12,000	1,600	6,000	398
Total (33 districts)			196,040	3,371	73,639	18,887	91,262	8,881

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008



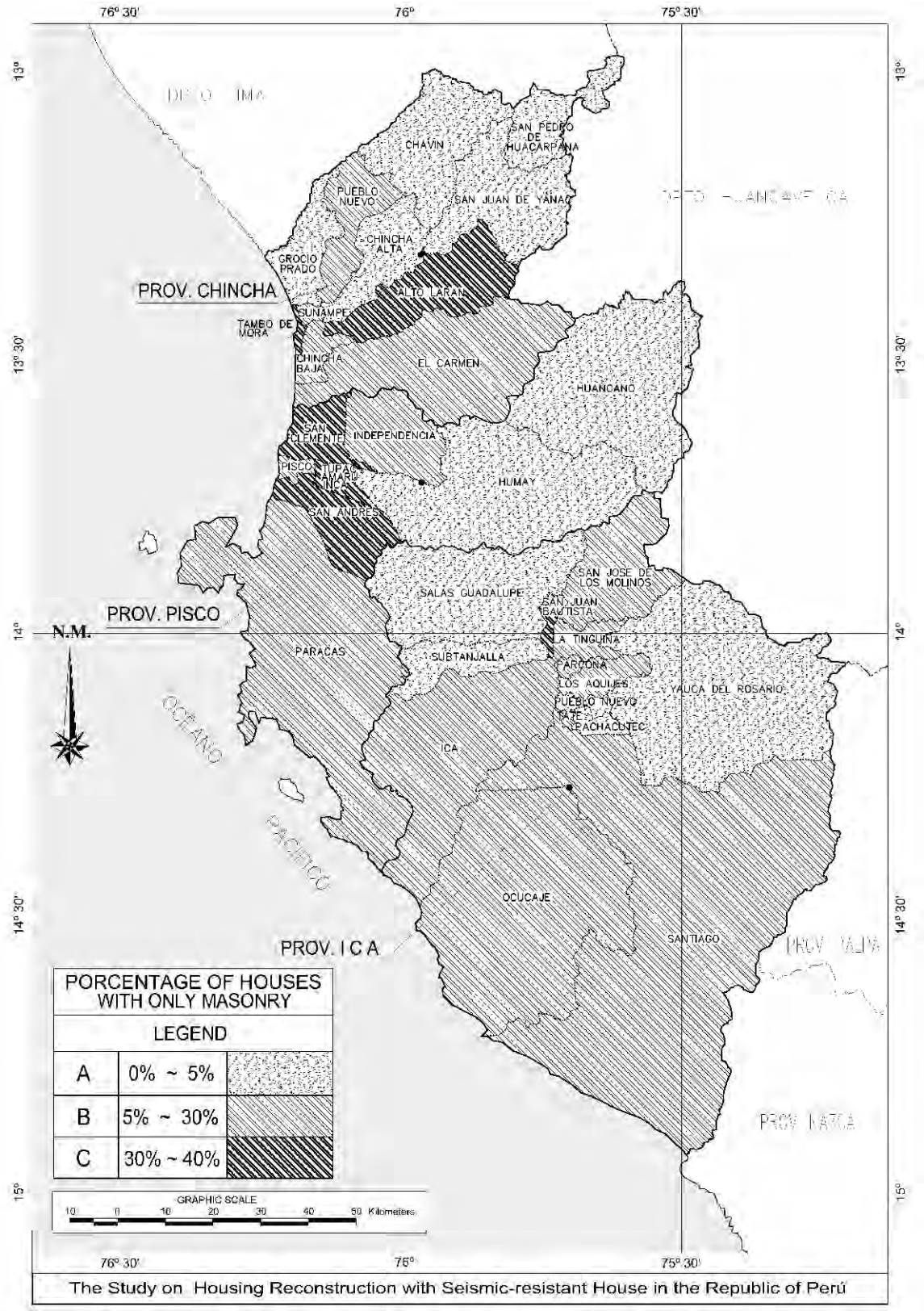
Source: JICA Study Team

Figure 5.1 Percentage of Houses of RC in 33 Districts



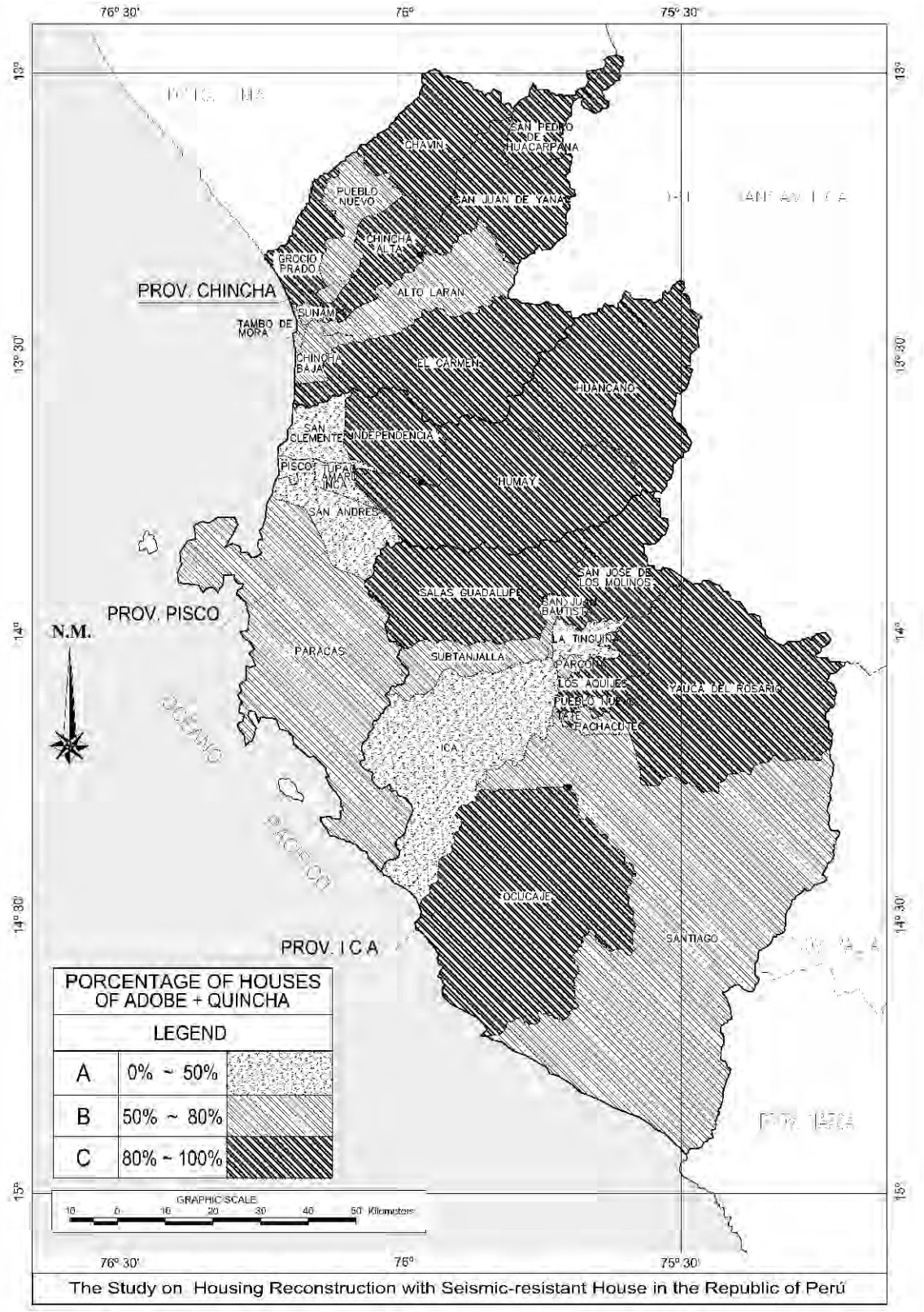
Source: JICA Study Team

Figure 5.2 Percentage of Houses of Confined Masonry in 33 Districts



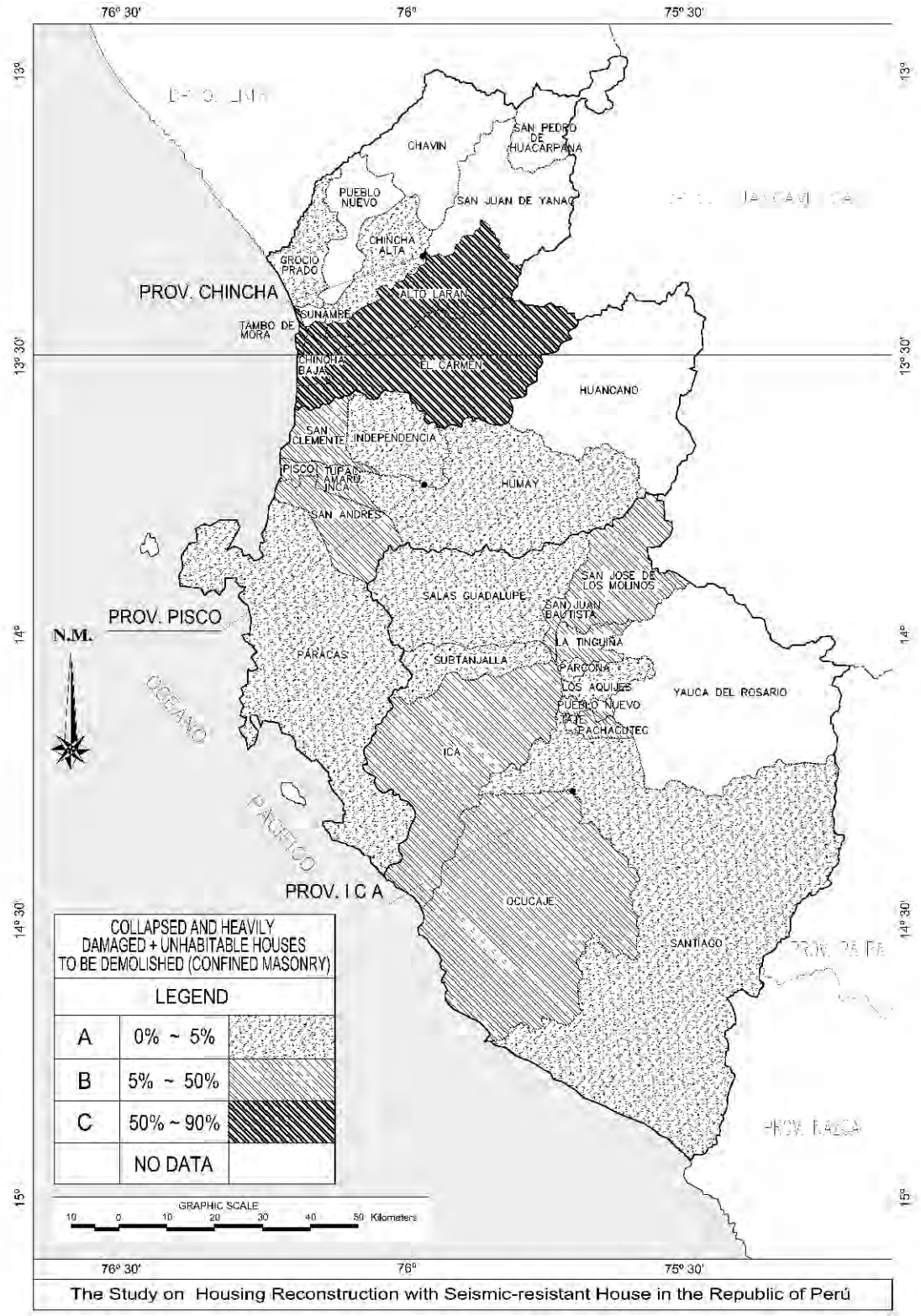
Source: JICA Study Team

Figure 5.3 Percentage of Houses with only Masonry in 33 Districts



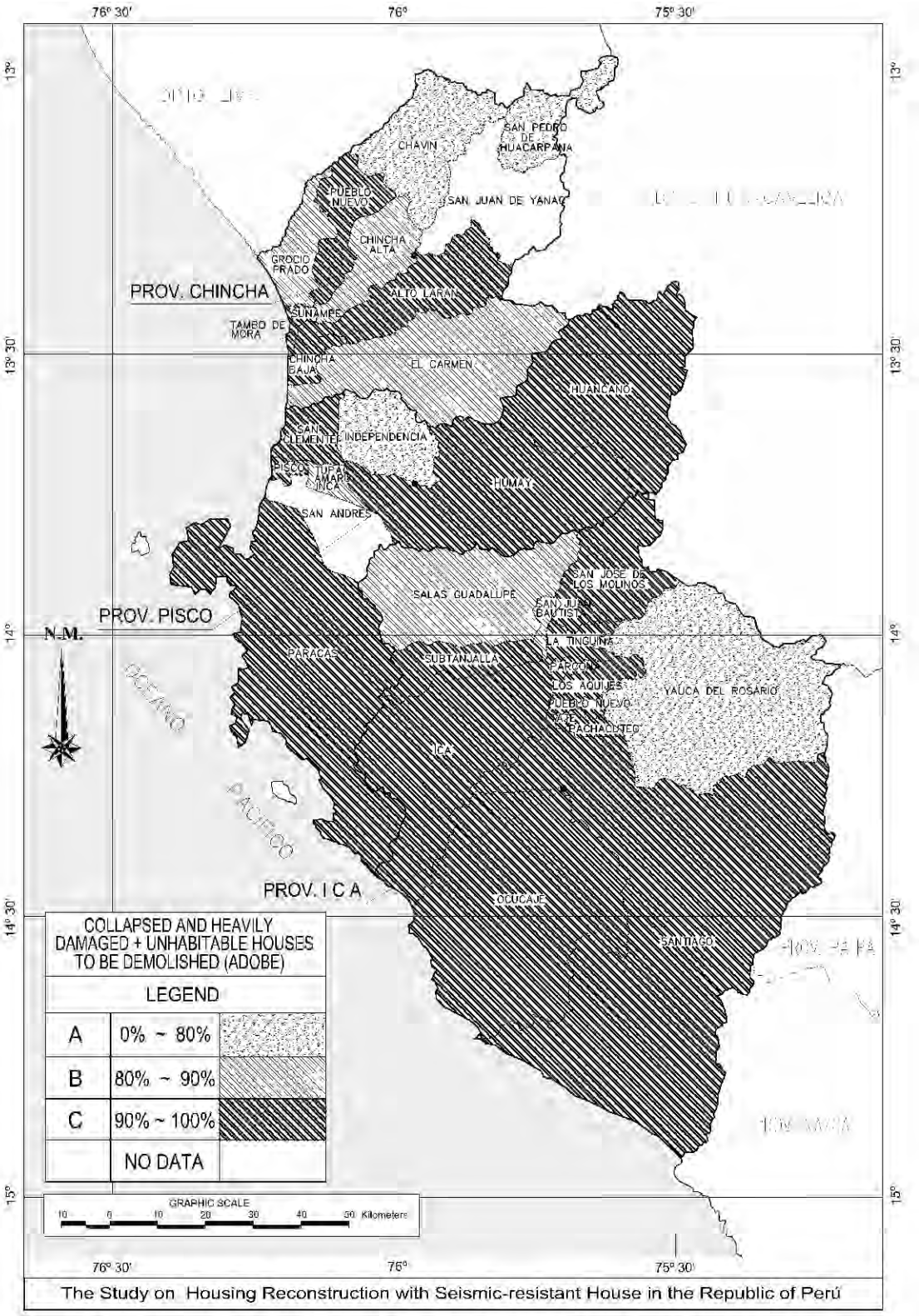
Source: JICA Study Team

Figure 5.4 Percentage of Houses of Adobe + Quincha in 33 Districts



Source: JICA Study Team

Figure 5.5 Collapsed and heavily Damaged + Uninhabitable Houses to be Demolished in Confined Masonry in 33 Districts



Source: JICA Study Team

Figure 5.6 Collapsed and Heavily Damaged + Uninhabitable Houses to be Demolished in Adobe 33 Districts

Damage Level of Housing by the earthquake.

Table 5.3 Damage Level of Housing

unit: house, (%)

a) Houses collapsed and heavily damaged	b) Uninhabitable houses to be demolished	c) Houses to be repaired	d) Houses without damage	Total
60,336(30.8)	43,609 (22.2)	44,286 (22.6)	47,809 (24.4)	196,040 (100)

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Remark: The number of houses by damage level is from the 2nd survey result made by INDECI or from the survey made by the municipality

Table 5.4 Housing Damage Conditions of the Earthquake by District

unit: house

Province	No.	District	a) Number of houses collapsed and heavily damaged	b) Number of uninhabitable houses to be demolished	c) Number of houses to be repaired	d) Number of houses without damage
			house	house	house	house
Chincha	1	Alto Laran	1,174	4,698	784	1,174
	2	Chavin	71	67	19	530
	3	Chincha Alta	6,530	1,532	1,256	10,314
	4	Chincha Baja	307	1,460	482	251
	5	El Carmen	466	1,468	577	0
	6	Grocio Prado	1,150	2,758	650	467
	7	Pueblo Nuevo	5,372	2,628	3,948	0(0)
	8	San Juan de Yanac	336	144	0	0
	9	San Pedro de Huacarpana	110	280	360	200
	10	Sunampe	2,406	2,501	1,723	0
	11	Tambo de Mora	519	423	63	395
Ica	1	Ica	9,000	3,000	15,000	23,000
	2	La Tinguina	4,414	2,558	969	0
	3	Los Aquijes	1,248	1,248	624	0
	4	Ocucaje	400	320	394	6
	5	Pachacutec	840	420	112	28
	6	Parcona	2,925	3,510	1,989	3,276
	7	Pueblo Nuevo	1,053	287	27	0
	8	Salas Guadalupe	1,769	1,573	590	0
	9	San Jose de Los Molinos	767	511	457	91
	10	San Juan Bautista	1,349	297	666	1,397
	11	Santiago	3,180	660	420	1,740
	12	Subtanjalla	1,095	1,643	365	548
	13	Tate	720	250	110	120
	14	Yauca del Rosario	206	427	104	0
Pisco	1	Huancano	376	162	0	0
	2	Humay	1,013	507	168	0
	3	Independencia	700	1,925	700	175
	4	San Andres	904	669	826	1,534
	5	San Clemente	1,507	1,182	1,223	163
	6	Tupac Amaru Inca	715	311	2,084	0
	7	Paracas	114	190	1,596	0
	8	Pisco	7,600	4,000	6,000	2,400
Total (33 districts)			60,336	43,609	44,286	47,809

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Table 5.5 Damage Level of Reinforced Concrete (Concreto Armado) Houses

unit: house, (%)

a) Houses collapsed and heavily damaged	b) Uninhabitable houses to be demolished	c) Houses to be repaired	d) Houses without damage	Total
302 (9.7)	145 (4.7)	446 (14.4)	2,213 (71.2)	3,106 (100)

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Remark: The number of districts is 7.

Table 5.6 Damage of Reinforced Concrete (Concreto Armado) Houses by District

unit: house

Province	No.	District	Total number of Reinforced Concrete (Concreto Armado) Houses	a) Collapsed and heavily damaged houses	b) Uninhabitable houses to be demolished	c) Houses to be repaired	d) Houses without damage
Chincha	1	Alto Laran	149	30	15	7	97
	3	Chincha Alta	1,080	38	16	5	1,021
	4	Chincha Baja	250	200	0.0	0.0	50
	6	Grocio Prado	125	2	1	1	121
	7	Pueblo Nuevo	597	2	7	8	580
Ica	8	Salas Guadalupe	275	0	0	275	0
Pisco	4	San Andres	590	30	106	112	342
	7	Paracas	38	0	0	38	0
	8	Pisco	2	0	0	0	2
Total (9 districts)			3,106	302	145	446	2,213

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Table 5.7 Damage Level of Confined Masonry (Albanieria Confinada) Houses

unit: house, (%)

a) Houses collapsed and heavily damaged	b) Uninhabitable houses to be demolished	c) Houses to be repaired	d) Houses without damage	Total
3,330 (4.8)	5,751 (8.4)	15,067 (21.9)	44,714 (64.9)	68,862 (100)

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Remark: The number of districts is 19.

Table 5.8 Damage of Confined Masonry (Albanieria Confinada) Houses by District

unit: house

Province	No.	District	Total number of Confined Masonry (Albanieria Confinada) Houses	a) Collapsed and heavily damaged houses	b) Uninhabitable houses to be demolished	c) Houses to be repaired	d) Houses without damage
Chincha	1	Alto Laran	180	54	63	11	52
	3	Chincha Alta	491	7	3	3	478
	4	Chincha Baja	150	120	0	0	30
	5	El Carmen	126	101	0	0	25
	6	Grocio Prado	125	2	1	1	121
	11	Tambo de Mora	70	41	22	7	0
Ica	1	Ica	40,000	0	2,000	2,000	36,000
	2	La Tinguina	4,074	0	1,507	2,567	0
	3	Los Aquijes	13	0	0	13	0
	4	Ocucaje	22	0	2	13	7
	5	Pachacutec	280	126	0	126	28
	6	Parcona	3,510	0	0	175	3,335
	7	Pueblo nuevo	21	2		19	
	8	Salas Guadalupe	354	0	0	354	0
	9	San Jose de Molino	182	4	9	146	23
	10	San Juan Bautista	556	56	28	56	416
	11	Santiago	1,500	23	24	41	1,412
	12	Subtanjalla	1,095	0	10	548	537
	13	Tate	120	5	0	5	110
Pisco	2	Humay	84	0	0	84	0
	3	Independencia	70	0	0	70	0
	4	San Andres	708	42	156	170	340
	5	San Clemente	1,222	98	98	1,026	0
	6	Tupac Amaru Inca	1,244	249	25	970	0
	7	Paracas	665	0	3	662	0
	8	Pisco	12,000	2,400	1,800	6,000	1,800
Total (26 districts)			68,862	3,330	5,751	15,067	44,714

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Table 5.9 Damage Level of Only Masonry without Concrete Frame (Albanileria) House

unit: house, (%)

a) Houses collapsed and heavily damaged	b) Uninhabitable houses to be demolished	c) Houses to be repaired	d) Houses without damage	Total
6,260 (33.7)	3,107 (16.7)	6,688 (36.0)	2,501 (13.6)	18,556 (100)

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Remark: The number of districts is 17.

Table 5.10 Damage of Only Masonry Without Concrete Frame (Albanileria) Houses by District

unit: house

Province	No.	District	Total number of Only Masonry Without Concrete Frame(Albanileria) Houses	a) Collapsed and heavily damaged houses	b) Uninhabitable houses to be demolished	c) Houses to be repaired	d) Houses without damage
Chincha	1	Alto Laran	2,498	998	625	375	500
	3	Chincha Alta	393	6	2	0	385
	4	Chincha Baja	150	135	0	0	15
	5	El Carmen	126	6	6	114	0
	7	Pueblo Nuevo	1,195	597	478	120	0
	11	Tambo de Mora	420	294	105	21	0
Ica	1	Ica	2,500	125	125	2,250	0
	2	La Tinguina	1,628	1,026	602	0	0
	3	Los Aquijes	480	336	0	144	0
	4	Ocucaje	112	45	56	11	0
	5	Pachacutec	60	48	12	0	0
	6	Parcona	1,170	1,053	0	117	0
	8	Salas Guadalupe	118	0	0	118	0
	9	San Jose de Los Molinos	182	18	18	128	18
	10	San Juan Bautista	1,113	334	89	133	557
	11	Santiago	300	3	0	240	57
	13	Tate	120	0	6	108	6
Pisco	1	Huancano	2	0	0	2	0
	2	Humay	68	0	0	68	0
	3	Independencia	280	0	0	100	0
	4	San Andres	1,573	220	267	283	803
	5	San Clemente	1,222	306	306	610	0
	6	Tupac Amaru Inca	1,151	230	23	898	0
	7	Paracas	95	0	67	28	0
	8	Pisco	1,600	480	320	640	160
Total (25districts)			18,556	6,260	3,107	6,688	2,501

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Table 5.11 Damage Level of Sun-Dried Brick (Adobe) Houses

unit: house, (%)

a) Houses collapsed and heavily damaged	b) Uninhabitable houses to be demolished	c) Houses to be repaired	d) Houses without damage	Total
54,695 (60.8)	27,287 (30.3)	4,355 (4.8)	3,616 (4.1)	83,953 (100)

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Remark: The number of districts is 21.

Table 5.12 Damage of Sun-Dried Brick (Adobe) Houses by District

unit: house

Province	No.	District	Total number of Sun-Dried Brick (Adobe) Houses	a) Collapsed and heavily damaged houses	b) Uninhabitable houses to be demolished	c) Houses to be repaired	d) Houses without damage
			house	house	house	house	house
Chincha	1	Alto Laran	3,500	1,050	2,100	175	175
	2	Chavin	639	66	62	18	493
	3	Chincha Alta	17,177	8,159	6,871	0	2,147
	4	Chincha Baja	1,900	1,900	0	0	0
	5	El Carmen	1,757	852	600	305	*0*
	6	Grocio Prado	4,523	2,940	905	542	136
	7	Pueblo Nuevo	5,975	3,286	2,390	299	0
	9	San Pedro de Huacarpana	830	341	86	175	228
	10	Sunampe	4,973	2,238	2,536	199	0
	11	Tambo de Mora	826	826	0	0	0
Ica	1	Ica	7,500	6,000	1,125	375	0
	2	La Tinguina	2,033	2,033	0	0	0
	3	Los Aquijes	2,377	1,664	713	0	0
	4	Ocucaje	202	81	101	20	0
	5	Pachacutec	1,010	505	505	0	0
	6	Parcona	7,020	6,950	0	70	0
	7	Pueblo Nuevo	1,159	1,159	0	0	0
	8	Salas Guadalupe	2,949	1,180	1,180	589	0
	9	San Jose de Los Molinos	1,280	768	512	0	0
	10	San Juan Bautista	1,855	1,113	370	186	186
	11	Santiago	3,900	3,120	585	195	0
	12	Subtanjalla	2,228	780	1,448	0	0
	13	Tate	900	360	540	0	0
	14	Yauca del Rosario	679	20	394	14	251
Pisco	1	Huancano	536	376	160	0	0
	2	Humay	1,452	1,016	436	0	0
	3	Independencia	2,100	420	1,050	630	0
	5	San Clemente	1,386	277	970	139	0
	6	Tupac Amaru Inca	622	249	249	124	0
	7	Paracas	665	466	199	0	0
	8	Pisco	6,000	4,500	1,200	300	0
Total (31districts)			83,953	54,695	27,287	4,355	3,616

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Table 5.13 Damage Level of Cane and Mud (Quincha) Houses

unit: house, (%)

a) Houses collapsed and heavily damaged	b) Uninhabitable houses to be demolished	c) Houses to be repaired	d) Houses without damage	Total
1,518 (22.5)	1,356(20.2)	2,244(33.4)	1,611(23.9)	6,729(100)

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Remark: The number of districts is 21.

Table 5.14 Damage of Cane and Mud(Quincha) Houses by District

unit: house

Province	No.	District	Total number of cane and mud (Quincha) houses	a) proportion of collapsed and heavily damaged houses	b) proportion of uninhabitable houses to be demolished	c) proportion of houses to be repaired	d) proportion of houses without damage
			house	house	house	house	house
Chincha	1	Alto Laran	1,503	150	45	301	1,007
	2	Chavin	48	1	1	1	45
	3	Chincha Alta	491	0	1	1	489
	4	Chincha Baja	50	10	0.0	0.0	40
	5	El Carmen	251	101	75	75	0
	6	Grocio Prado	252	252	0	0	0
	7	Pueblo Nuevo	597	597	0	0	0
	11	Tambo de Mora	70	70	0	0	0
Ica	4	Ocucaje	784	236	470	78	0
	5	Pachacutec	50	25	25	0	0
	9	San Jose de Los Molinos	182	0	0	182	0
	11	Santiago	300	60	210	15	15
	12	Subtanjalla	328	16	312	0	0
	13	Tate	60	0	60	0	0
Pisco	3	Independencia	1,050	0	0	1,050	0
	4	San Andres	315	0	157	143	15
	8	Pisco	398	0	0	398	0
Total (17districts)			6,729	1,518	1,356	2,244	1,611

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Table 5.15 Conditions of Collapsed Houses by District

Province	No.	District	a) Comments on the critical points as seismic resistance
CHINCHA	1	Alto Laran	Basically, this constructions didn't follow adequate building processes. This is a consequence of the lack of technical knowledge to build a seismic resistant building. There is no minimum criteria to for self-construction of these kinds of housing
	2	Chavin	In the building we can notice deficient unions between walls. There are shear failures because of the lack of structural reinforcements.
	3	Chincha Alta	Unnecessary load to adobe walls by constructing RC beams on these walls. Turning failure
	4	Chincha Baja	There are too many houses that don't have columns and short vertical walls as reinforcement. Lack of technical supervision
	5	El Carmen	Lack of structural reinforcement. Mistakes using RC beams above the windows and doors
	6	Grocio Prado	Beams don't have columns that can be confined. These elements are simply supported on walls
	7	Pueblo Nuevo	The distances between walls are very large. Inadequate quantity of steel reinforcement in RC elements
	8	San Juan de Yanac	Lack of structural reinforcement. Housing on hills or near to rivers
	9	San Pedro de Huacarpana	Bad building processes. Lack of dissemination of information. Bad structural system
	10	Sunampe	There is no a good control by municipality in constructions. Deficient structures without reinforcements
	11	Tambo de Mora	Lands with presence of salts, shear failures because of inadequate reinforcements.
ICA	1	Ica	Shear failure. Lack of vertical confinements. Humidity problems
	2	La Tinguina	Shear failure. Foundation of adobe bricks
	3	Los Aquijes	Excessive distance between walls (10m) Shear failure
	4	Ocucaje	Shear failure. Detachment of orthogonal walls
	5	Pachacutec	Shear failure. Foundation of adobe bricks. Inadequate disposition of wood roofing structure
	6	Parcona	Lack of confinement elements. Shear failure in both directions
	7	Pueblo Nuevo	Inadequate footing. Detachment between wall and roof
	8	Salas Guadalupe	Absence of reinforcements in structure determined the collapse. Abode without straw, lack of reinforcement in walls, windows and doors
	9	San Jose de Los Molinos	Absence of reinforcements in structure determined the collapse. Abode without straw, lack of reinforcement in walls, windows and doors
	10	San Juan Bautista	The failure of the elements above the windows and doors caused the collapse of roofing
	11	Santiago	Lack of confinement elements in walls
	12	Subtanjalla	Shear failure in walls. Detachment of walls
	13	Tate	Excessive distance between walls. Inadequate disposition of wood roofing structure
	14	Yauca del Rosario	Shear failure in walls. Detachment of walls

PISCO	1	Huancano	Failures of elements above windows and doors caused collapse of roofing
	2	Humay	Definitely the absence of reinforcement caused the collapse
	3	Independencia	Corners of structure failed. Failure in windows and doors
	4	San Andres	Use of masonry in first floor and confined masonry in second floor. Lack of continuity
	5	San Clemente	The old building and absence of reinforcement elements
	6	Tupac Amaru Inca	The house was built on sandy soil producing settlement. Large windows and doors. Typical shear failure
	7	Paracas	Liquation of soil. High level of water of underground. Poor joint between columns and beams
	8	Pisco	Failure points were unions between walls

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Table 5.16-1 Conditions of Collapsed Houses by District

(Outline of a collapsed house)

Province	No.	District	a)Structure type	b) conditions of the collapse	c) others	d) major causes of the collapse
Chincha	1	Alto Laran	Adobe, confined masonry	Shear failure in walls, inadequate structural elements	Buildings without good confinement	Sand soils. Poor concrete mixing. Concrete not hydrated
	2	Chavin	Adobe	Houses located in hills. Bad constructions because of the lack of construction methods	Lack of over-footings	Lack of reinforcement in structure. The roofs are simply supported
	3	Chincha Alta	Adobe mixed with RC elements in the structure	Adobe walls without reinforcement	RC buildings without confinement	Behaviour of sandy soils. Adobe buildings don't follow Building Code. Construction mistakes because of self-construction
	4	Chincha Baja	Adobe, confined masonry	Don't have structural system suitable, no confinement, unqualified workforce	Buidings without confinement	Mistakes in self-construction (lack of qualified forcework). Walls without structural reinforcement
	5	El Carmen	Adobe, confined masonry	Structures don't have suitable structural systems	RC structures of bad quality. Compression resistant of 140 kg/cm2 in structural elements	Walls without confinement. Mistakes in self-construction. Low quantity of cement in concrete. Non hydrated concrete
	6	Grocio Prado	Confined masonry	Bad spacement between hoops	Bad osification of mortar	Bad design of structure
	7	Pueblo Nuevo	Adobe, confined masonry	Shear failure in walls, bad spacing between hoops in RC columns	Structures without confinement	Bad design of structure
	8	San Juan de Yanac	Adobe	Adobe walls without reinforcement (verticals and horizontals)	Total lack of knowledge of construction of seismic resistant housing	Old houses, lack of support and technical supervision, bad building process (self-construction), location of lands
	9	San Pedro de Huacarpana	Adobe	Bad building process	Bad self-construction system	Houses located in hills, large distance between walls, bad connections roof-wall, bad foundation, don't have ring beam
	10	Sunampe	Adobe and masonry	Bad technical support, sandy soil	Bad supervision	Large distances between walls, soil quality, bad reinforcement
	11	Tambo de Mora	Adobe and masonry	Sub-soil water. The water of the sea covered the square of this district	Adobe without reinforcement verticals nor horizontals	Adobe: without reinforcement, large distances between walls, height of walls. Masonry: lack of confinement between walls.

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Table 5.16-2 Conditions of collapsed houses by District

(Outline of a collapsed house)

Province	No.	District	a)Structure type	b) conditions of the collapse	c) others	d) major causes of the collapse
ICA	1	Ica	Adobe	Strongly affected	To be demolished	Excessive height (4m) Failure because of settlement. Lack of confinement
	2	La Tinguina	Adobe	Strongly affected	To be demolished	Settlement of walls. Lack of confinement. Detachment of walls
	3	Los Aquijes	Adobe	Strongly affected	To be demolished	Settlement of walls. Lack of confinement
	4	Ocucaje	Quincha	Strongly affected	To be demolished	Inadequate building process. Overload in roof. Excessive height of walls (2.65m)
	5	Pachacutec	Adobe	Strongly affected	To be demolished	Lack of vertical confinement. Excessive distance between walls.
	6	Parcona	Adobe	Strongly affected	To be demolished	Settlement of walls. Lack of confinement. Detachment of walls
	7	Pueblo Nuevo	Masonry and adobe	Partially affected	To be demolished	Inadequate use of incompatible materials adobe and masonry. Long distances. Overload of concrete roofing
	8	Salas Guadalupe	Adobe	Old building. Non seismic resistant design		Lack of reinforcement
	9	San Jose de Los Molinos	Adobe	Old building. Non seismic resistant design		Lack of reinforcement
	10	San Juan Bautista	Adobe	Old building. Lack of reinforcement elements		Very large windows and doors without reinforcements. Walls ate by insects
	11	Santiago	Adobe	Strongly affected	To be demolished	Excessive distance between walls, wooden roofing structure simple supported in walls
	12	Subtanjalla	Adobe	Strongly affected	To be demolished	Excessive height (2.80m) Excessive distance between walls
	13	Tate	Adobe	Strongly affected	To be demolished	Inadequate confinement. Poor adobe bricks
	14	Yauca del Rosario	Adobe	Strongly affected	To be demolished	Inadequate building process. Irregular layers of adobe walls

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Table 5.16-3 Conditions of Collapsed Houses by District

(Outline of a collapsed house)

Province	No.	District	a)Structure type	b) conditions of the collapse	c) others	d) major causes of the collapse
PISCO	1	Huancano	Adobe	Bad quality of adobe. Lack of reinforcements in walls. Failures in joints between walls and corner of windows and doors		Large windows and doors. Weak point because of the absence of reinforcement elements
	2	Humay	Adobe	Bad quality of adobe, without straw. Housing located in hill. Large windows and doors		Weak union between walls and large of windows and doors. Lack of reinforcement
	3	Independencia	Adobe and confined masonry	Use of both materials adobe and confined masonry. Lack of reinforcements		Absence of reinforcement elements
	4	San Andres	Masonry	Old building. Absence of reinforcement in structure		The use of masonry without confinement
	5	San Clemente	Masonry and adobe	Lack of reinforcement in structure. Old building (1940)		Union of walls without reinforcements. Adobe without straw. Insects eat the adobe. Old building
	6	Tupac Amaru Inca	Confined masonry	Liquation of the soil. Bad quality of concrete. Poor union between column and beam		Liquation of the soil. Poor concrete and corrosion of the steel bars.
	7	Paracas	Confined masonry	Liquation of the soil		Settlement of the house because of the soil liquation. Poor joint between beam and column
	8	Pisco	Adobe and masonry	Lack of reinforcement in structure. Adobe withot straw		Location near epicentre. Lack of reinforcement elements. Insects ate adobe

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

PROGRESS OF HOUSING RECONSTRUCTION

Table 5.17 Housing Reconstruction Progress by District

Province		District	a) Number of temporary houses already provided	b) Number of beneficiaries to be listed in BONO	d) Number of permanent houses to have reconstructed or be under construction	e) Number of permanent houses to have applied to a building permit	g) Number of permanent houses to have already received Techo Propio
			(house)	(family)	(house)	(house)	(house)
Chincha	1	Alto Laran	540	600	40, 0	20	20
	2	Chavin	0	71	0, 0	0	0
	3	Chincha Alta	1,000	8,300	0, 580	300	150
	4	Chincha Baja	300	1,200	0, 400	100	20
	5	El Carmen	400	2,400	0, 120	50	0
	6	Grocio Prado	2,500	4,500	0, 100	200	100
	7	Pueblo Nuevo	0	7,035	230, 250	300	160
	9	San Pedro de Huacarpana	Tents (80)	39	0, 0	15	0
	10	Sunampe	150	3,800	0, 370	1,250	220
	11	Tambo de Mora	70	850	15, 20	0	0
Ica	1	Ica	200	6,500	0, 0	100	100
	2	La Tinguina	120	1,205	0, 0	100	50
	3	Los Aquijes	150	2,225	120, 1,600	1,600	600
	4	Ocucaje	237	500	0, 0	0	0
	5	Pachacutec	250	1,800	30, 470	100	30
	6	Parcona	120	4,000	0, 0	580	0
	7	Pueblo Nuevo	420	1,200	4, 20	75	9
	8	Salas Guadalupe	1,996	1,000	0, 0	50	n.a.
	9	San Jose de Los Molinos	700	600	0, 20	3	0
	11	Santiago	400	2,362	1, 0	20	1
	12	Subtanjalla	1,152	2,000	0, 0	1,100	0
	13	Tate	285	505	0, 0	200	0
	14	Yauca del Rosario	160	204	0, 0	0	0
Pisco	1	Huancano	2	350	0, 10	0	0
	2	Humay	500	1,089	0, 0	0	0
	3	Independencia	100	1,320	0, 300	20	0
	4	San Andres	100	872	58, n.a	18	4
	5	San Clemente	n.a.	1,595	13, 250	186	n.a.
	6	Tupac Amaru Inca	n.a.	1,400	45, n.a.	0	354
	7	Paracas	100	100	70, 0	0	0
	8	Pisco	6,000	8,000	1,500, 250	46	n.a.
Total (33districts)			18,082	67,622	2,126, 4760	6,433	1,818
Average			581	2,049	64, 153	194	55

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Table 5.18 Building Permit by District

Province	No.	District	a) No. of officials in charge of building permit	b) No. of officials in charge of construction inspection	c) criteria of building permit	d) best way to deal with many building permit applications
			(person)	(person)		
CHINCHA	1	Alto Laran	2	1	Review of structures plans according to the Code	Politics and application of control of technical area of urban development with support of INDECI
	2	Chavin	1	1	According to normative of Code. Inspection of location of housing	Knowledge of building method and implementation of theoretical and practical programs
	3	Chincha Alta	1	2	Soil studies, designing of structure according with Code, impermeated foundation, confined masonry, slenderness	Politics and application of urban control of municipalities with INDECI support
	4	Chincha Baja	1	2	TUPA, PUCP, Peruvian Code, and recommendations of CISMID	Review of project and control of building construction
	5	El Carmen	2	1	According to normative of Code. Revision of structural planes, inspections of soil type	With direction of SENCICO to train workforce in the district to can build better
	6	Grocio Prado	2	2	Housing plan. Architectural plan, structures, electrical and sanitary installations	Have knowledge of structures in housing construction. Capacitation of staff
	7	Pueblo Nuevo	2	2	Evaluation of building project in charge of Review Committee	Review of project by qualified staff and control of building
	8	San Juan de Yanac	2	2	The roofing must have inclination to permit flow of rain water. Constructions must be supervised by a qualified person	Politics and application of control of municipality with support of other institutions
	9	San Pedro de Huacarpana	1	2	According the Code. Review and aprobation in charge of civil engineering	Building of housing in adequate places with previous evaluation in building processes, qualified staff in charge of evaluation of these processes
	10	Sunampe	2	1	Soil studies, seismic resistant designs	People decide the best way with a previous capacity and exposition of construction of seismic resistant house
	11	Tambo de Mora	1	1	Presentation of plans. Documentation of land. Normative. Review and aprobation by public work office	Apply for building permit and supervision by municipality

ICA	1	Ica	6	3	Soil studies	Bank of projects, standard models
	2	La Tinguina	4	2	Design and location of housing	Administrative and technical support to damaged people
	3	Los Aquijes	4	3	Sanitation of housing. Urban parameters. Soil type	Exoneration of payments. Typical projects
	4	Ocucaje	0	0	No response	No response
	5	Pachacutec	2	1	Soil type. Height of building	Model projects
	6	Parcona	8	6	<120 m2 approved by municipality; >120 m2 review committee(CIP)	Typical desings <120 m2
	7	Pueblo Nuevo	2	1	Location of housing	Improve TUPA(administrative plan)
	8	Salas Guadalupe	2	0	None	Demand seismic resistant designing according to the Code, previous capacity of the masons. Punishing owners and masons who don't fulfil the Code
	9	San Jose de Los Molinos	1	4	According to the construction norms	Be stronger in fulfilment of municipalities dispositions about design with seismic resistant criteria in housing constructions
	10	San Juan Bautista	1	1	According to the valid Code	Municipal orders to demand the fulfilment of Code in constructions
	11	Santiago	2	2	Quality of soil	Stantar projects
	12	Subtanjalla	3	1	Building type, soil type	Typical designs
	13	Tate	1	1	Location and according to Code	Disseminate TUPA
	14	Yauca del Rosario	0	0	0	Have public works office in the future
PISCO	1	Huancano	3	1	People follow the technical normative of construction	No response
	2	Humay	3	0	None	No response
	3	Independencia	1	0	According the Code	Give incentives for people who ask for building permit to follow the construction criteria according to the Code. Train the people
	4	San Andres	3	0	None	Require the compliance of seismic resistant normative in the moment of submit of building permit
	6	Tupac Amaru Inca	2	2	Criteria according to the Code, soil studies and structures design	Have more field inspectors to supervise the building permit properly
	7	Paracas	1	0	None	Make a municipality law to bind seismic resistant reconstruction; previously organize training in self-construction
	8	Pisco	1	1	Follow the building normatives	Punish drastically to informal people

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Table 5.19-1 Issues of Housing Reconstruction by Building Permit by District

Province	No.	District	a) efforts of facilitating housing reconstruction made by the municipality	b) problems of reconstructing seismic resistance houses	c) strong points of the municipality in terms of reconstructing seismic resistance houses	d) constraints or burdens to facilitate a reconstruction of seismic resistant houses
CHINCHA	1	Alto Laran	Reduce administrative costs. Supervision of damaged housing	Cost of seismic resistant houses are expensive	We coordinate with FORSUR and they gave us cement bags and temporary houses	Lack of support of government entities
	2	Chavin	Coordination FORSUR. They give us construction materials: cement	Budget issues	Good earth and good quality with presence of clay	Budget issues
	3	Chincha Alta	Gave facilities to promote reconstruction. Exoneration of payment to damaged people	Don't have seismic microzonification; lack of knowledge of seismic resistant systems in ordinary people and contractors; constructions without technical support in 90% of cases	Creation of bank of seismic resistant projects. Reduce administrative procedures to facilitate reconstruction	Lack of qualified workforce; lack of control of prices of materials, speculation of prices materials
	4	Chincha Baja	Exoneration of payments of all kind of housing	Cost of projects and materials are more expensive now	Minimum administrative submits for building of seismic resistant house	Lack of money, technical support, location of houses near to rivers and beaches
	5	El Carmen	To sign conventions with NGO's. Exoneration of payment to all kind of housing	Lack of budget and staff	Towns are in urban area	Problems with demolition of houses and lack of temporary houses to protect damaged people
	6	Grocio Prado	To coordinate with many housing programs, facilitate the submit of building permit, exoneration of payment for building permit, self-construction workshops	Budget issues	Majority of cases the payment for building permit was exonerated	Soil studies - self construction with lack of knowledge of soil
	7	Pueblo Nuevo	Elimination of rubbles and guide to people to build planned housing, with professional designs and review for committee and control of construction	Lack of dissemination; designing and control of designs	There are good material to build seismic resistant houses	Budget issues and lack of knowledge in general of constructive processes

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Table 5.19-2 Issues of housing reconstruction by Building Permit by District

Province	No.	District	a) efforts of facilitating housing reconstruction made by the municipality	b) problems of reconstructing seismic resistance houses	c) strong points of the municipality in terms of reconstructing seismic resistance houses	d) constraints or burdens to facilitate a reconstruction of seismic resistant houses
CHINCHA	8	San Juan de Yanac	Complete survey of the district for evaluation. Ask for help to INDECI	Lack of money(because these buildings are expensive). Transport of materials rose 30% above normal price. Bad roads, accidental geography	Motivate people since primary and high school. Minimum administrative requirements to facilitate reconstruction	Transport of materials very expensive. Lack of qualified staff for these kind of constructions
	9	San Pedro de Huacarpana	To look for help of INDECI, DEFENSA CIVIL, NGO, REGIONAL and PROVINCIAL	Budget issues	Presence of zones with soil of rock. Good soil to build	Lack of support of entities. Budget issues and lack of training programs
	10	Sunampe	Elimination of rubbles, reposition of basic services	No problem	Good type of soil. Distribution of land	Lack of money of people to ask for building permit; lack of knowledge of Techo Propio; elimination of rubbles
	11	Tambo de Mora	Relocation of people whose houses collapsed because of liquefaction of soil. Distribution of 8 Ha for relocation with budget of FORSUR	Type of soil and groundwater level is in some places under 0.50m under the structure	Provide an office for technical support	Just in the zone declared in emergency or uninhabitable by INDECI (low zones of the district)
ICA	1	Ica	To coordinate with central government. Exoneration of payments	No supervision in field. No seismic resistant projects	Especialized organization	Lack of equipment
	2	La Tinguina	Help in administration of BONOS. Exoneration of payments for building permit	Budget issues and lack of technical direction	Good soil. Technical support and coordination with municipality	Speculate with material prices
	3	Los Aquijes	Coordination in region, government, NGO	Too many institutions in reconstruction	Qualified workforce available	Delay in the implementation of programs
	4	Ocucaje	Coordination in Ministry of Housing, NGO, COFOPRI	Lack of money. No property tittles	People want to cooperate	Lack of owner's title and communication services
	5	Pachacutec	Coordination with Central government-Bco. Materiales	Lack of training programs for masons	Logistic support and distribution of equipment	Lack of budget to get public works
	6	Parcona	To ask for support to NGO, Red Cross, FORSUR	Lack of knowledge of constructive processes	Support with machines	Low municipal budget. Lack of technical staff

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Table 5.19-3 Issues of housing reconstruction by Building Permit by District

Province	No.	District	a) efforts of facilitating housing reconstruction made by the municipality	b) problems of reconstructing seismic resistance houses	c) strong points of the municipality in terms of reconstructing seismic resistance houses	d) constraints or burdens to facilitate a reconstruction of seismic resistant houses
ICA	7	Pueblo Nuevo	Coordination with Region, UN, private company	Typo of soil in archeological areas	Qualified workforce available. Support with machines	Lack of support of government entities
	8	Salas Guadalupe	To give facilities to damaged people submitting building permit just to 35 soles and welcoming all training programs, stable convention with COPRODELI whose support beneficiaries in coordination with Ministry of Housing to help reconstruction	Damaged people doesn't have money to build a seismic resistant house, besides, the soil is sand and bad to build on it	Materials are easy to get in the zone	Budget issues
	9	San Jose de Los Molinos	To give straw and galvanized roofs to damaged people. To do easier administrative submits	Lack of money and lack of knowledge of masons about seismic resistant designs	Its easy to get construction materials in the zone. Good soil type, good quality of professional in charge of inspections of constructions who are hired temporarily to supervise constructions	Lack of qualified workforce; lack of control of prices of materials, speculation of prices materials
	10	San Juan Bautista	To make easier the administrative submits to damaged people. Galvanized roofing was given to some damaged houses	Lack of money of people makes impossible to buy materials with good quantity and quality. Lack of knowledge of masons of seismic resistant designs	Quality type. Technical support given by municipalities to damaged people	Lack of money, technical support, location of houses near to rivers and beaches
	11	Santiago	Evaluation of housing	Lack of knowledge of BONO	Good administrative organization	Problems with demolition of houses and lack of temporary houses to protect damaged people
	12	Subtanjalla	Coordination in Ministry of Housing, NGO	Funding of constructions	Workforce available	Soil studies - self construction with lack of knowledge of soil
	13	Tate	Coordination in Ministry of Housing and Banmat	Lack of budget	Workforce available. Good soil	Budget issues and lack of knowledge in general of constructive processes

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Table 5.19-4 Issues of housing reconstruction by Building Permit by District

Province	No.	District	a) efforts of facilitating housing reconstruction made by the municipality	b) problems of reconstructing seismic resistance houses	c) strong points of the municipality in terms of reconstructing seismic resistance houses	d) constraints or burdens to facilitate a reconstruction of seismic resistant houses
ICA	14	Yauca del Rosario	To ask for support of Banco de Materiales	Lack of thecnical staff	Help of comunity	Lack of money, topography
PISCO	1	Huancano	Lack of budget. Just could give galvanized plates to some damaged people	For lack money, Adobe is the only solution, masonry is expensive. People wants to be trained	Good soil of Huancaro	The cost of transport of materials, beneficiaries BAN MAT CARD have to buy in authorized places where prices are high. No thecnology to can selfconstruction for owners
	2	Humay	None	Problems of cost of material because of demand. Average person can't pay a seismic resistant house. Too many self construction, no use of thecnical criteria	Building permit are free, facilities in administration to can help in housing reconstruction	All facilities to housing reconstruction. Principal constraint is lack of money and lack of knowledge of people to can build seismic resistant houses and shortage of construction materials
	3	Independencia	Exoneration of payment for building permit to damaged people	High cost of reconstruct seismic resistant houses, people like to have big rooms, this cause low density of walls	Quality of soils is good. Officers in municipality are willing to help in any program.	Economic issue. People are limited to build 25m far from the Panamericana highway and 25m far from Pisco River.
	4	San Andres	Exoneration of payment for building permit to damaged people. Showing of zonification map so they have knowledge where to build safely	Damaged people doesn't want to live in a seismic resistant house because they want big spaces without columns. Lack of money is other cause and lack of knowledge of Code	It's easy to get construction materials in the zone	The zonification map of INDECI warning great risk in coast of San Andrés (red zone) urban area, while in rural zone there are no basic services and no owner's titles and they can access to bonos. 40% of housing are on owner's property

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

Table 5.19-5 Issues of housing reconstruction by Building Permit by District

Province	No.	District	a) efforts of facilitating housing reconstruction made by the municipality	b) problems of reconstructing seismic resistance houses	c) strong points of the municipality in terms of reconstructing seismic resistance houses	d) constraints or burdens to facilitate a reconstruction of seismic resistant houses
PISCO	5	San Clemente	Its already developed a standard house of 48 m2, con set of planes and specifications signed for structural engineer for damaged can access freely to this design. Besides there's no payment for building permit to damaged people. Administrative facilities and inspections in charge of municipality to get seismic resistant houses	People doesn't like seismic resistant house (pendant beams) they don't find attractive these type of beams. Besides BONO6000 isn't enough to build a seismic resistant house	Type of soil in urban zone is good, there are workforce available and it's easy to get construction materials in the zone	Owner's titles are request to access bonos. Municipality can't manage too many constructions in district
	6	Tupac Amaru Inca	Administrative facilities(to get owner's facilities), implementation of factory of cement bricks to can help people to access housing	Lack of money. Lack of knowledge of construction systems	It's easy to get construction materials in the zone. The zone is far from the sea, so there's no risk of tsunamis, good soil	BONO isn't enough to build this kind of structure
	7	Paracas	Coordination with FORSUR and support of reconstruction giving for free sand and stones to damaged people, besides, exonerate the payments for building permit	High cost of reconstruction of seismic resistant houses and cost of transporting materials	The predisposition of officers to can help in any theme related to reconstruction	Lack of money
	8	Pisco	Accelerate the access to BONO	The lack of knowledge of Code	Good quality of soil, capacity of 2.0 Kg/cm2, variety of materials in the zone, good professional level in the zone	Informality, high cost of materials, besides there is just one engineer to supervise all the constructions

Source: Field survey for 33 district municipalities, JICA Urgent Development Study, April of 2008

VOLUME 2

Stakeholder Survey

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CHAPTER 1 BACKGROUND OF THE SURVEY

1.1. Objectives of the Study

The objectives of this stakeholder survey are "to investigate various impediments to the reconstruction of houses of victims of the devastating earthquake of August 2007 in order to facilitate the progress of the house reconstruction with earthquake resistant techniques by conducting a series of stakeholder surveys". This survey will reveal the risk factors which this pilot project may face during its preparation and implementation and which must be properly addressed. In addition, this survey will also make the pilot project to prepare for the possible setbacks and obstacles to prevent their negative impact on the development of the pilot project activities in advance.

There is a wide range of stakeholders involved in this project. The victims of the earthquake or affected population are the primary stakeholders of the project. They are also the target group of this project. Within this affected population there are different population strata which can be divided by income, occupation, age, gender, extent of damaged by the earthquake, etc. There are also stakeholders surrounding the earthquake affected population who directly and indirectly impact the project and the target population. These are at the regional, province and district levels of local government. Additionally, construction related entities and construction workers such as albañiles or masons are very close to the affected populations and it is very possible that they will seek assistance in reconstruction of houses on a daily basis. Also, aid agencies i.e. UN, bilateral organizations and NGOs are assisting the affected population. This stakeholders' survey will also focus on the capacity of institutions and performance of the local government personnel, such as officers of the housing and construction section who will authorize and scrutinize building permits to people who are preparing the reconstruction. This is to determine needs in order to identify their capacity building and training needs to facilitate the progress of the reconstruction of houses of the earthquake affected population. Other factors will be also revealed by the study and they will finally lead to the development of pilot projects. Therefore, this stakeholder survey will underline and determine the conditions for the measures required to maximize the impact of the pilot projects.

1.2. Requirement for Identifying Impediments to the Introduction of Seismic-resistant Housing

In previous cases after major earthquakes many seismic-resistant housing plans were developed by various governments, international organizations and private sectors. Although they consumed a huge amount of resources and time, they were seldom widely adopted by the affected population. Those housing plans were formulated by a typical top-down and non-consultative methodology doomed to failure from the beginning. The affected populations were so afraid of the previous method and materials of construction which

caused so many casualties, that they simply neglected new housing techniques and opted for materials that are lighter and non-lethal when they collapse or are damaged to rebuild their housing, even sacrificing safety and living conditions by using plastic sheets and timber. They were very light but very cold in winter and very hot in summer. For example, after the devastating earthquake of October 8, 2005 struck Northern Pakistan, many seismic-resistant or earthquake safer housing projects and designs were introduced or developed for the earthquake victims by UN, international organizations and NGOs in order to reduce the risk of earthquake damage. Many model houses were built, and many training sessions were held for this purpose. Despite so many efforts and benefits of the seismic-resistant technique for the affected population, said techniques were never widely accepted by the affected population.

In order not to repeat these mistakes, it is imperative to investigate the reasons and factors which prevent and which might prevent the dissemination and acceptance of the technique by the population. The study will investigate the impeding factors which prevented these new designs of seismic-resistant housing from being accepted by the earthquake affected population. In addition, the psyche of the affected population should be taken into account. After experiencing a very traumatic event it is very easy to understand that the affected population might simply reject ideas of using conventional materials for reconstruction of houses of which were widespread and affordable before the tragic event. Their behavioral tendency in decision making of housing reconstruction should be also investigated to identify the obstacles against them coming to a decision to reconstruct their houses with seismic-resistant techniques. Therefore, it is essential to include the procedures to solve these impeding factors within the project and minimize the risk of not being adopted by the affected population from the commencement of project planning.

1.3. Investigating Various Factors of the Project

In order to find out the impeding factors of the project, this study has comprehensively investigated the problems of stakeholders, inter alia, socio-economic conditions and livelihoods of earthquake affected population of the post-earthquake environment. The situation of the industrial and economic structure of the region will also affect their livelihoods. In this particular project, factors hindering the progress of the project can be classified in two major areas; earthquake affected populations' socio-economic and socio-political situations. Socio-economic conditions are the major factor which will determine the behaviors of the reconstruction initiatives of the earthquake affected population, because the amount of the fund for reconstruction they can access or afford will inevitably control the timing and the size of the reconstruction. It will also regulate the location, method and who will carry out the reconstruction of housing by self-construction, construction companies and local house-builders or Albañiles. Other socio-economic conditions affecting them are; land ownership, amount of income, type of income,

occupation, number of family member in a house, educational backgrounds, etc. There are institutional or socio-political conditions that also affect the reconstruction and earthquake affected population. The institutional conditions that have an effect on housing reconstruction are land ownership and its registration. Land ownership and its registration is a daunting problem in Peru. In 1995, more than 1.5 million informal urban properties were located in the eight largest cities in Peru. This led to the creation of COFOPRI in 1995 . In Ica Region alone, there were more than 65,000 properties registered in the seven years between 1996 and 2002. Despite the registration effort, there were more than 14,000 cases of unregistered and non-registered property in the Ica Region prior to the earthquake .

For the economic environment, industry of the Ica region is heavily dependent on agriculture, such as plantations of asparagus, cotton, grape, paprika, etc. The affected population work in those farms and food processing factories of agriculture product as day laborers earning wages between S/5 to S/18 per day . The damage to the agricultural infrastructure such as irrigation and water supply system may lead to reduced production. This decrease in production may eventually lead to less income for the poorer strata of the affected population. Moreover, price hikes in petroleum and petroleum related products are also giving a strong body blow to the affected population's recovery of their livelihoods. This economic downturn will also affect the development of the process and the decision making and financial condition of the affected population for the reconstruction of their houses. The survey will also consider these economic aspects which affect decision making and the prioritization of the factors needed for the reconstruction of the houses of the earthquake affected population.

In addition, the study will investigate the institutional factors such as construction regulations, the process of issuing a building permit, availability of technical assistance for proper and quality construction in the local government level which are affecting or may affect the reconstruction progress. Also, how the cost of reconstruction with seismic-resistant technique housing may affect the decision making of reconstruction of houses by the affected population. Land rights issues including procedures of land registration, population's economic conditions and degree of poverty, access to funds and credit for reconstruction will be also examined.

1.4. Design of the Survey

1.4.1. Approach of the Study

Empirical findings show that poor countries and the poor population are prone to natural disasters. Limited or lack of capacity of the disaster preparedness and disaster mitigation of those governments make a country and its population more vulnerable to natural disasters. The absence of early warning systems and contingency planning make the damage and loss worse. The powerful cyclone which hit Bangladesh in 1991 devastated large parts of country

and killed nearly 140,000, leaving 10 million homeless. And in 2004, a tsunami caused by a gigantic underwater earthquake in Aceh, Sumatra led to casualties totaling up to 230,000 in 14 countries of South East and South West Asian countries and extending to the African continent. The loss was exacerbated by the lack of early warning system and disaster preparedness in those countries. The countries' capacity of disaster preparedness and disaster mitigation has a direct effect on the consequences of the disaster. On the other hand, the population's socio-economic situation coincides with the scale of damage and loss, especially with the income level of the population. In 1992, Cairo, Egypt, with a population of 12 million was hit by a not-so-strong quake of M5.9 killing 450 people. Most of the casualties lived in the poor corner of the city where living conditions were underprivileged. In this area construction techniques and building structures were substandard. In contrast, other areas of the city where the middle-class population lives were not so affected by this earthquake. It is possible to deduce that poorer populations are more exposed to risks of natural disaster and its damage. They are also defenseless to rebuild their livelihoods as a result of weak socio-economic status. They tend to be left behind in the assistance measures of the government, because of their minimal influence on the political process and its decision making.

In this study of the impeding factors of the earthquake affected population in Peru, this same approach can be applied to examining the population. Of the earthquake of 2007 in Peru, it is reported that most of the affected population were the poor who mainly work in farms as daily laborers. This poor population affected by the earthquake mostly lives in houses built with adobe or sun-dried mud bricks which are cheap, but susceptible to the strong tremors of earthquakes. After the quake the majority of their houses were totally damaged or seriously damaged and needed major repair and reconstruction. According to the stake holder survey conducted in the study, all population interviewed had major damage to their houses. And 61.5 percent of population or 136 households interviewed lost their houses and 38.5 percent needed major repair on houses. However, they do not have enough income to repair and purchase household items needed to rebuild their livelihoods. It is also reported that this poor population has no land or does not have its land registered so that it is difficult for them to reconstruct their houses, because some government assistance schemes require land title. It is also difficult for them to reconstruct houses only with the government grant of Bono S/6,000, which was widely given to the affected population, when prices of the construction materials are becoming very high due to the high demand of reconstruction. Additionally, the prices of food and other commodities are increasing so fast that their livelihoods are also disturbed and reconstruction efforts are hampered. It is also reasonable to assume that due to their deprived and discriminated status, necessary information related to housing reconstruction and benefits for reconstruction may not have been communicated well to the affected population. Therefore, it is natural to imagine that there is a wide gap in communication and

access to information between the affected population and the government at central and regional levels which make them very vulnerable and excluded from necessary assistance.

1.4.2. Applied Methodology: PRA

The methodology applied by this study is called Participatory Rural Appraisal (PRA) which is a major approach and widely adopted method in developing countries to investigate the situations and needs of development projects of the target groups. By applying this PRA method in this particular post-earthquake reconstruction of housing project, stakeholders will be able to identify and find ways to resolve obstacles to reconstruction of houses through its participatory manner which involves analyzing and reviewing the problems and arriving at solutions by themselves. Therefore, it will make it possible to collect firsthand information and identify obstacles to the project. And it will also make it possible for solutions to be identified by stakeholders.

In this survey, semi-structured interviews will be carried out as a baseline survey to capture the earthquake affected population's current situation and their understanding of the existing situation in general. This exercise will also collect relevant information on other stakeholders' problems in reconstructing their houses. In addition, Focus Group Discussion (FGD) will be conducted with various stakeholder groups to reveal their different ideas, problems they face, assistance needs, hopes and expectations for reconstruction of houses. Throughout this FGD, workshops will be conducted by means of dialogues between stakeholders to center the way to resolve the issues they are facing in the current environment. In these FGDs, they will discuss their obstacles to reconstruction of houses and study the approach to resolve them by themselves in order to make the approach durable and sustainable. Some measures will be taken by implementing pilot project to reduce the risk of the impeding factors against the project and directly addressing them.

Photo: Interviewing affected women (right), Santiago, Apr 2008

CHAPTER 2 IMPLEMENTATION OF THE SURVEY

2.1. Geographic Area of Study and Dates

This survey was carried out in three provinces of Chincha, Ica and Pisco of Ica Region in which JICA earthquake-resistant housing pilot projects are to be implemented. Seven districts in these three provinces were selected on the basis of consultations with the local government regarding damage was most severe and needs of reconstruction of housing are extremely high.

Table 2.1 Place and Date of the Study

Place	Date
La Tinguiña – Ica	18/04/08
Salas Guadalupe - Ica	19/04/08
Santiago – Ica	20/04/08
Santiago – Ica	20/04/08
San Clemente - Pisco	21/04/08
San Clemente - Pisco	22/04/08
San Andres – Pisco	21/04/08
San Andres – Pisco	22/04/08
El Carmen – Chincha.	23/04/08
El Carmen - Chincha	24/04/08
Tambo de Mora – Pisco	24/04/08

Source: JICA Study Team, 2008

Within these seven selected Districts, survey areas were determined based on the advice of the municipality in which damage caused by the earthquake was very serious. It also assisted the Study team to find out and interview various categories of the affected population from different backgrounds.

2.2. Survey Target and its Number: Stakeholders

2.2.1. The Target

The target groups of this survey are the stakeholders of the proposed pilot projects to be implemented in three Provinces. These stakeholders can be divided into three groups; earthquake affected population, construction related private entities and government officials at local levels. For the affected population, public groups active within the community of the earthquake affected population, such as Vaso de Leche (Milk Club), mothers groups, workers groups, etc were key informants who were consulted to identify impeding factors affecting the progress of housing reconstruction.

Photo: Workshop participants discuss their views on reconstruction of housing

2.2.2. Stakeholders

They are the population which will be most affected by impeding factors and therefore possess important information. In addition, they are also one of the expected beneficiaries of this project. As a result, it is pertinent to study those groups carefully in this study. We have selected 15 to 25 participants from three to four stakeholders groups in three districts totaling more than 250 stakeholders.

Addition to the affected population by the earthquake, construction related entities were also examined. The study found that there are two categories of construction related entities. One is the construction companies which build private houses and develop housing estates on the outskirts of the town. They are also appointed by the Housing Ministry to assist in building houses for the earthquake affected population through the Bono scheme. Therefore, they are also the key informants with information on how the Government assistance scheme operates on the ground and what the problems are of those schemes which hamper the development of house reconstruction. While they have professional construction skills, they can also provide technical assistance to the affected population. There are also important stakeholders called masons or albañiles who are contracted for the private construction work by the people who build their houses by themselves. They are also key informants who should be studied because of their close relationship with the affected population and their role in the reconstruction of houses. They are the main skilled labors who execute the actual construction of houses contracted by the client i.e. the affected population who lost or got their houses damaged or destroyed by the earthquake in this case. The third tier of stakeholders is the officials of the regional and provincial governments and the municipalities. They have direct contact with the affected population through building permits, and post-building house inspection. Thus they have information and knowledge of problems for facilitating house reconstruction and its related issues. The study will conduct a workshop with them to find out the problems they are facing and understand their perception of those problems and plan solutions for them.

2.2.3. Duration and Schedule of the Survey

The survey was conducted during two weeks from mid April. The survey teams conducted the study; interviews and workshops about four days in each province. They conducted two sessions of focus group discussion/workshops per district. Prior to the workshops, interviews were held to collect baseline data of the affected population, such as type of house, damage to the house and income. A workshop and interview session took a total of about four to five hours.

Table 2.2 Schedule of Field Survey

Place	Date	Participants
La Tinguiña – Ica	18/04/08	26 people. Men: 5, Women: 21 from the mothers´ club
Salas Guadalupe - Ica	19/04/08	53 people Men 12, Women: 41 from the community
Santiago – Ica	20/04/08	15 people. Men: 2, Women: 13 from the mothers´ club
Santiago – Ica	20/04/08	25 people. Men: 04, Women: 21 from the mothers´ club
San Clemente - Pisco	21/04/08	19 women Milk club mothers
San Clemente - Pisco	22/04/08	18 women Milk club mothers
San Andres – Pisco	21/04/08	16 women from the mothers' club
San Andres – Pisco	22/04/08	17 women from the mothers' club
El Carmen – Chincha	23/04/08	20 people Men: 01, Women: 19 Milk club mothers
El Carmen - Chincha	24/04/08	20 people. Men: 01, Women: 19 Milk club mothers
Tambo de Mora – Pisco	24/04/08	18 people. Men: 8, Women: 10

Source: JICA Study Team, 2008

2.2.4. Survey Team

The Study was conducted by two teams. One team comprised three members including a team leader and two team members, one female and one male. They all have extensive experience in development work, especially working with the poor community. They also have experience in organization and facilitation of grassroots and women so that the study can extract real voice and needs from them in a participatory manner.

CHAPTER 3 RESULTS OF THE STAKEHOLDER SURVEY

In this chapter the overall situation of the affected population collected by interviews of the survey will be presented. This will help to give us a brief look at the target population who are the intended beneficiaries of the project.

3.1. Overall Situation of the Affected Population

The survey has interviewed 221 earthquake affected people in seven districts of three provinces of Chincha, Pisco and Ica. The profile of the target group is given below in tables gathered by questionnaires of the interview.

Table 3.1 Number of People Interviewed

District	Number	Percent
La Tinguina	25	11.3
Salas Guadalupe	38	17.2
Santiago	32	14.5
San Clemente	35	15.8
San Andres	33	14.9
Tambo de Mora	18	8.1
El Carmen	40	18.1
Total	221	100.0

Source: JICA Study Team, 2008

3.2. Construction Company and Albañil

Interviews were also conducted to find out the construction circumstances of construction companies and Albañiles, or masons in Ica for the problems regarding the reconstruction of houses in the earthquake affected region. The study considers them as important stakeholders in the issue of reconstruction of houses, because they are the actual service providers who construct houses and provide technical inputs on construction. They also are the actors who have primary contacts with the officials of the construction sector and therefore they have important information on reconstruction related issues in the region, such as the market situation of construction materials and housing, construction regulations of housing and current trends in housing reconstruction.

3.2.1. Construction Company

From the interviews conducted with the construction companies, most of them witness the current high prices of construction materials and think that this is hampering reconstruction. The price of some basic construction materials such as concrete has increased by 100% from S/20 to S/40 per 1 m3 after the earthquake. They also report the increase in labor cost. It also doubled after the earthquake from S/15 per day to S/30 per day for an assistant mason. They think that this is affecting the speed of the development of the reconstruction of houses. They

also believe that building permits which are issued by the municipality and are necessary for building houses are being issued late. It now takes from two weeks to 90 days and this lengthy process obstructs the reconstruction of houses. It also affects the cost of construction because the total cost of house reconstruction changes because of increases in construction materials in that stage of the process. They even report the change in procedures to submit documents which were not required for construction before the earthquake. Those construction companies mention the high demand for skilled construction workers. They face shortages of trained and skilled workers who are vital for constructing quality and earthquake resistant houses. The affected populations are also very eager to have technical assistance and learn about skillful construction for the reconstruction of houses. They strongly feel more intervention and financial commitment by the government are required to increase housing reconstruction activities, as well as control measures to check price increases of construction materials.

3.2.2. Albañiles

The study also asked Albañiles for their thoughts and ideas for the reconstruction of houses. From the interviews and questions with the affected population, they are the main constructors and service providers for housing construction. Therefore, it is essential to ask their opinions and views on what is happening on the ground. Interviews with them also collected the thoughts of Albañiles regarding the problems obstructing the reconstruction of houses.

They report that the issue of building permits takes a long time and that is the client's responsibility, with the result that, they sometimes even start construction without a permit. They also face problems of increase in construction material prices. Late disbursement of Bono is leading some affected population to borrow funds from the commercial banks. They claim that Bono S/6,000 is not enough for reconstruction of a house when prices of materials and labor are increasing day by day. They also face shortage of labor to work for them. They are interested in training in earthquake resistant housing and improve construction skills.

3.3. District Officers

The study held a workshop at Ica Regional government on 28 April with its housing reconstruction focal points and with the counterparts of the District level. We have presented to them the above findings from the various workshops held in seven districts and discussed those problems. The discussion was held on a result-oriented basis in order to identify and agree on realistic ways to solve those problems which were raised by the affected population and by the local government participants. It is interesting to note that most of the opinions on important issues by the affected population were shared by the government officials as well. The following issues were raised by the officials.

- Lack of government consciousness (still in an emergency situation)

- Greater and more efficient information diffusion effort by the government
- More economic resources to be given for reconstruction
- More trained human resources needed
- Construction material price controls

It is worth noting that the officials agreed that the general situation of the Ica Region is still on an emergency basis. Although it has been eight months since the earthquake and the major emergency operations and their players have retreated from most of the affected areas, people's situation is not that different from the situation just after the earthquake. Only the immediate life threatening situation from the earthquake is over but the needs of the affected population are still great. The "gap" in assistance has emerged here and needs to be dealt with very quickly. Otherwise people's frustration could become difficult to control. District officials also pointed out that there is a communication gap between local and central levels. This seems to be the major reason for the delay in implementing the process of assistance for the affected population. Furthermore, the officials are willing to admit it. The need for greater economic resources also coincides with the first comment and the "gap" in assistance. The survey teams have witnessed the slow pace reconstruction activities in the region which has created stagnation in economic activities, leading to lower income and income opportunities for the affected population, which desperately needs more cash flow for rehabilitating their livelihoods. They also agreed with the need for more trained human resources that can increase the capacity of the local government and therefore facilitate the process of reconstruction activities by accelerating the paper work of building permits and other necessary procedures. The officials were also worried about the current soaring prices of construction materials. They suggest the need for government price controls to stabilize them. It is true that local government officials are also suffering from a lack of human resources and lack of capacity of the local government resulting in overstretched capacity to respond to the needs of the affected population.

Photo: Workshop with Municipality Officers, Ica Regional Office, 28 Apr

CHAPTER 4 FINDINGS OF THE SURVEY

The survey has revealed the situations of the stakeholders, such as the affected population, local government and construction related actors i.e. construction companies and Albañiles. It has also identified their problems, expectations, capacity and limitations, and their needs.

4.1. The Affected Population

4.1.1. Profile of Affected Population

The survey has exposed the socio-economic profile of the target group i.e. the affected population. 86.4% of them have partners or are married. The majority of females are housewives (39.4%) or not working (43.9%). The occupations of the male population are 16.3% farmer or 37.1% daily worker. Their average income is S/ 511 per month, which accounts for 94.1 percent. They are positioned in the two bottoms tier of the income strata classified by the government. Their average family size is 5.71 per family. 86.9% has education below high school and the illiteracy rate is 3.2%. The majority of them own land, 60.6% and also a house, 84.6%. The material of their house is Adobe, 70% built by their ancestors, 39.4% or mason, 60.4%. The damage to houses is severe. Fully damaged 61.5% and partially damaged 38.5% makeup 100% of the answers. 67.9% are eating less after the earthquake and there are even some reports of malnutrition among children. No substantial difference is found in terms of opinion on housing reconstruction between male and female.

4.1.2. Impeding Factors Identified

From the survey, it was discovered that most of them don't have sufficient funds due to unemployment or their working condition as casual labor. Hence, they have difficulties in access to loans and credit. To make things worse, current increases in construction materials, food prices and labor costs are seriously hampering the progress of the reconstruction of houses. Also, some people do not have land registration or house ownership, and it is therefore difficult for them to gain access to the assistance scheme, such as Techo Propio or they cannot apply for a bank loan. They also need technical assistance but major advice is given by Albañiles who are not professionally trained. They are also suffering from a lack of information for assistance and its process (Bono, Techo Propio). The survey has found Tambo de Mora has a different situation than other districts. It is located in the swamp near the sea and the government is planning to relocate the population. This was confirmed by the interviews. They also want to move to a different area.

4.2. Actions/Measures Needed

From the results of the survey, several impeding factors were discovered. They can be divided into background factors originating from poverty, lack of long-term employment,

lack of land title, etc. These factors and the population's economic situations were exacerbated by the earthquake which hit the region last year. Their living condition and livelihoods went from bad to worse. Unless strong measures and political will are applied to improving this situation, this deprived affected population will have to live in a horrendous environment for a long time. This vicious circle may lead to desperation among the affected population and eventually lead to the creation of anxiety and social unrest. They will never be able to reconstruct their houses if there is no strong and direct intervention. There is a very strong need to target the affected population for assistance directly and specifically provide benefits to increase their income so that they can reconstruct their houses and livelihoods soon, or provide reconstruction houses for the affected population.

Photo: Earthquake affected people (second right) listen to Municipality official for Assistance by the government

CHAPTER 5 SURVEY RESULT DATA

Questionnaire and results of the stakeholder survey are attached. The survey was planned to serve to collect baseline data of the condition of the earthquake victims.

5.1. Basic Information

The survey interviewed 221 people who were affected by the earthquake in seven districts of three provinces of Chincha, Pisco and Ica. Profile of the target group is given below in tables gathered by questionnaires of the interview. Background information of the interviewed people is as follows.[1]

Table 5.1 Number of Interviewed People

District	Number	Percent
La Tinguina	25	11.3
Salas Guadalupe	38	17.2
Santiago	32	14.5
San Clemente	35	15.8
San Andres	33	14.9
Tambo de Mora	18	8.1
El Carmen	40	18.1
Total	221	100.0

Source: JICA Study Team, 2008

5.1.1. Age

Ages of the interviewee range 18 to 70 averaging 29 years old and the sex of the interviewee is 86% women and 16% men.

Table 5.2 Sex Ratio

Sex	Number	Percent
Men	31	14.0
Women	190	86.0
Total	221	100.0

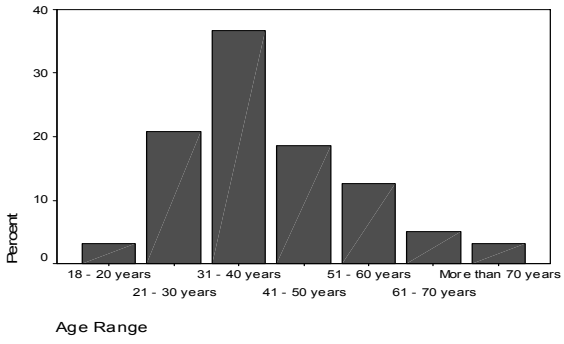

Figure 5.1 Age Range

[1] All tables and figures are produced based on interview survey results

5.1.2. Marital Status

According to the survey results, 86.4 percent of the interviewees are married (47.5 percent) or have partners (38.9 percent), 10.4 percent are single or divorced and 3.2 percent are widows. One widow's husband died when his health condition worsened after their house was destroyed by the earthquake.

Table 5.3 Marital Status

	Number	Percent
Single	19	8.6
Married	105	47.5
w/ Partner	86	38.9
Divorced	4	1.8
Widow	7	3.1
Total	221	100

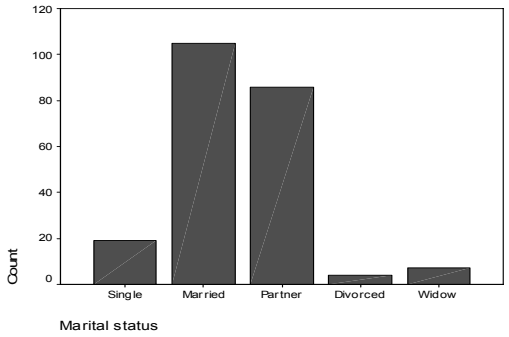

Figure 5.2 Marital Status

5.1.3. House Ownership

Of the 221 people interviewed, 84.6 percent own houses and 78.7 percent own land.

Table 5.4 House Ownership

	Number	Percent
Yes	187	84.6
No	34	15.4
Total	221	100.0

Table 5.5 Land Ownership

	Number	Percent
Yes	174	78.7
No	47	21.3
Total	221	100.0

In terms of occupation, 76 percent of the interviewees are housewives and 9.5 percent are daily wage workers.

Table 5.6 Occupation

Occupation	Number	Percent
Housewife	168	76.0
Daily laborer	21	9.5
Employee	15	6.8
Farmer	3	1.4
Fisherman	3	1.4
Cook	2	0.9
Student	2	0.9
Pensioner	7	3.2
Total	212	100

Figure 5.3 Occupation

5.1.4. Rent

Out of 221 interviewed, only five cases or 2.7 percent of the interviewees are paying rent ranging between S/30 to S/200. The average is S/100 per month.

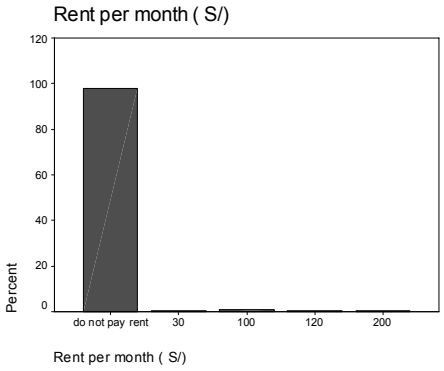

Figure 5.4 Monthly Rent Payment

5.1.5. Makeup/composition of the House

Most of interviewees (72.8 percent) live in a one- or two-bedroom house.

Table 5.7 Makeup/composition of House

No. of Bedrooms	Number	Percent
0	2	0.9
1	107	48.4
2	54	24.4
3	37	16.7
4	15	6.8
5	5	2.3
7	1	0.5
Total	221	100.0

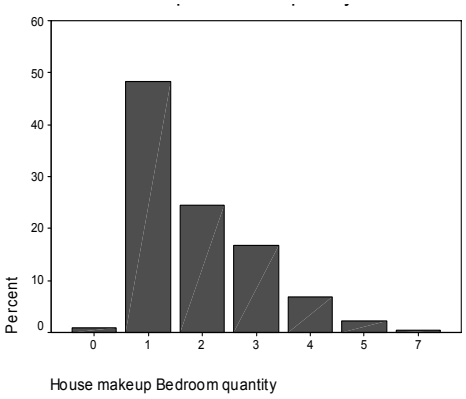

Figure 5.5 Makeup/composition of House

5.1.6. Bathroom

According to the survey, 36.2 percent of those interviewed do not have a bathroom in their house.

Table 5.8 Bathroom in House

	Number	Percent
Yes	141	63.8
No	80	36.2
Total	221	100.0

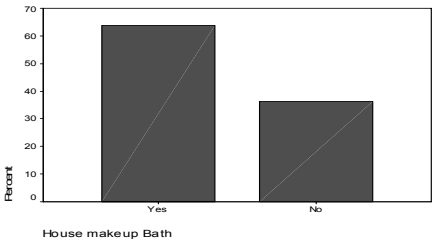

Figure 5.6 Bathroom in House

5.1.7. Age of House

Majority of houses of the interviewees were built between 1976 and 2007 (76.5 percent). The oldest house was built in 1908 of which four cases were reported.

Table 5.9 Age of House

Year Range	Number	Percent
1901- 1925	4	1.8
1926 – 1950	6	2.7
1951 – 1975	18	8.1
1976 – 2000	88	39.8
After 2000	81	36.7
Does not remember date	24	10.9
Total	221	100.0

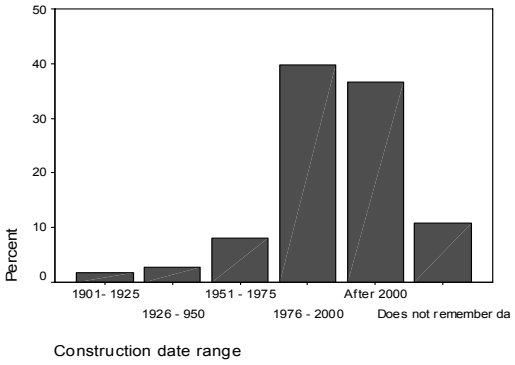

Figure 5.7 Age of House

Regarding the question of who constructed their house, 60.6 percent answered "mason". And 39.4 percent of houses were built by their families or ancestors.

Table 5.10 Constructor of House

Constructor of house	Number	Percent
Relative	87	39.4
Mason	134	60.6
Total	221	100.0

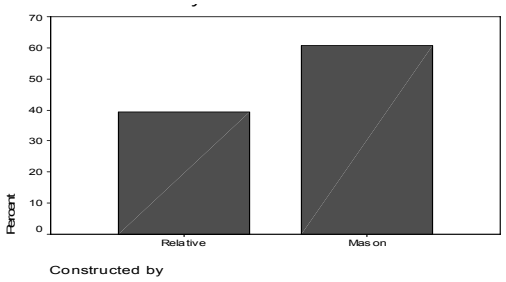

Figure 5.8 Constructor of House

5.1.8. BONO 6000

So far, only 4.5 percent have received financial assistance through the Bono 6000 program and 95.5 percent are still waiting for it.

Table 5.11 Bono 6000 Recipients

	Number	Percent
Yes	10	4.5
No	211	95.5
Total	221	100.0

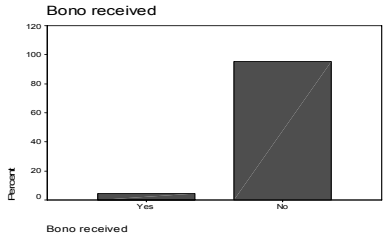

Figure 5.9 BONO 6000 Recipients

5.1.9. Number of People Living in House before Earthquake

The survey results show that, on the average, there are 5.1 persons living in one house before the earthquake struck; the minimum is one person and the maximum is 22 of which there are three cases.

Table 5.12 People Living in House before Earthquake

	Number	Percent
1 - 2 persons	10	4.5
3 - 5 persons	108	48.9
6 - 8 persons	79	35.7
More than 9 persons	24	10.9
Total	221	100.0

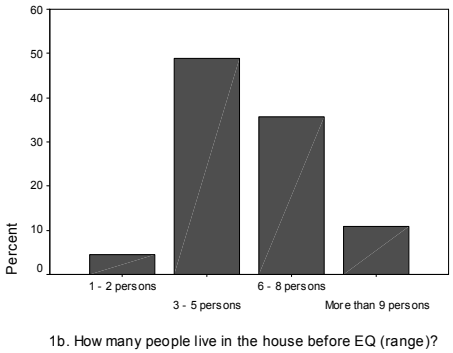

Figure 5.10 People Living in House Before Earthquake

5.1.10. Female Employment

For the female family members 83.4 percent are housewives or unemployed.

Table 5.13 Occupation of Female Family Member

Occupation	Number	Percent
Doesn´t work	97	43.9
Housewife	87	39.4
Employee	5	2.3
Cook	1	0.5
Farmer	7	3.2
Fisher	1	0.5
Daily worker	12	5.4
Trader	7	3.2
Other	1	0.5
Pensioner	1	0.5
Professional	2	0.9
Total	221	100.0

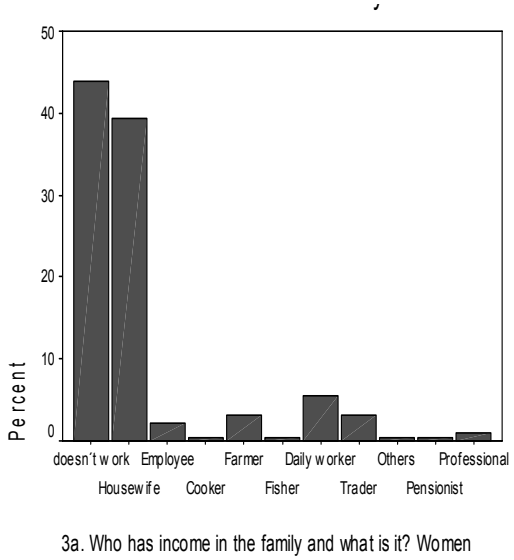

Figure 5.11 Occupation of Female Family Member

5.1.11. Male Employment

For the male family members 91.4 percent are engaged in some type of work. Most of them perform casual labor, i.e. working in the farm and day laborer, while 10.4 percent are masons with 23 cases.

Table 5.14 Occupation of Male Family Member

Occupation	Number	Percent
Doesn´t work	19	8.6
Farmer	36	16.3
Daily worker	82	37.1
Fishermen	29	13.1
Taxi driver	2	0.9
Pensioner	9	4.1
Trader	5	2.3
Mason	23	10.4
Driver (other than taxi)	3	1.4
Employee	3	1.4
Professional	10	4.5
Total	221	100.0

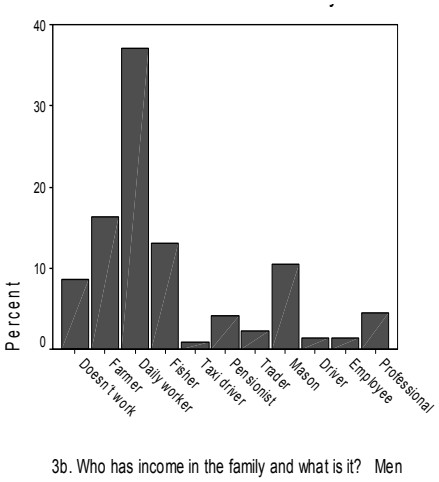

Figure 5.12 Occupation of Male Family Member

5.1.12. Educational Attainment

A high number of those interviewed received formal education (82.4 percent) with 34.4 percent having completed high school and higher education.

Table 5.15 Educational Attainment

Education level	Number	Percent
Complete primary	41	18.6
Incomplete primary	30	13.6
Incomplete secondary	63	28.5
Complete secondary	48	21.7
Complete superior	28	12.7
Incomplete superior	8	3.6
Illiterate	3	1.4
Total	221	100.0

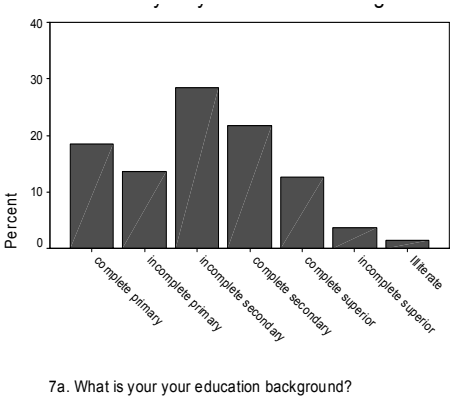

Figure 5.13 Educational Attainment

5.1.13. Improvement of Current Environment

When the interviewees were asked for their opinion on how to improve the current environment, 67 percent of them answered that they want their house to be reconstructed or improved.

Table 5.16 Improvement of Current Environment

House	Number	Percent
Yes	148	67.0
No	73	33.0
Total	221	100.0

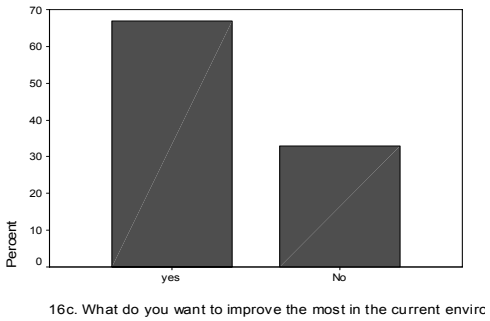

Figure 5.14 Improvement of Current Environment

5.1.14. Casualties by Earthquake

About one-third, or 30.3 percent, of those interviewed answered that a family member/s has been seriously hurt or injured in the earthquake.

Table 5.17 Casualties by Earthquake

	Number	Percent
Yes	67	30.3
No	154	69.7
Total	221	100.0

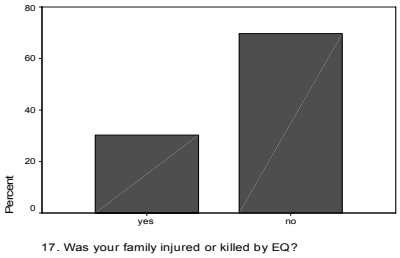

Figure 5.15 Casualties by Earthquake

5.1.15. Cause of Injury/Death

Those who answered that there had been casualties in their families gave “fall of the wall” as the actual cause (26.2 percent).

Table 5.18 Cause of the Injury/Death

	Number	Percent
Beam fall	1	0.5
Because of the EQ	2	0.9
Do not know	1	0.5
Not answered	158	71.5
Wall fall	58	26.2
Was sick	1	0.5
Total	221	100.0

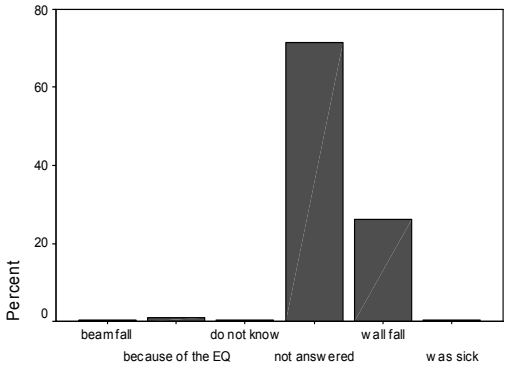

Figure 5.16 Cause of the Injury/Death

5.1.16. Preventable Loss

The interviewees who answered that there had been casualties in their families also said that their loss could have been prevented (61.5 percent).

Table 5.19 Preventable Loss

	Number	Percent
Yes	136	61.5
No	85	38.5
Total	221	100.0

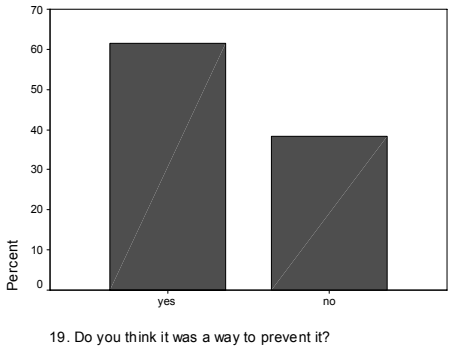

Figure 5.17 Preventable Loss

5.1.17. Type of House

Majority of interviewees (70.1 percent) were living in adobe houses.

Table 5.20 Type of House

	Number	Percent
No answer	12	5.4
Adobe	155	70.1
Brick	29	13.1
Quincha	25	11.3
Total	221	100.0

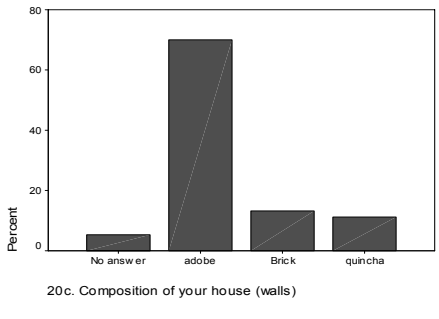

Figure 5.18 Type of House

5.1.18. House Structure

Majority of interviewees' houses (67.9 percent) did not have columns and beams for support.

Table 5.21 Structure of House

	Number	Percent
Doesn't have	150	67.9
Iron	35	15.8
Brick	3	1.4
Wood	26	11.8
Concrete	7	3.2
Total	221	100.0

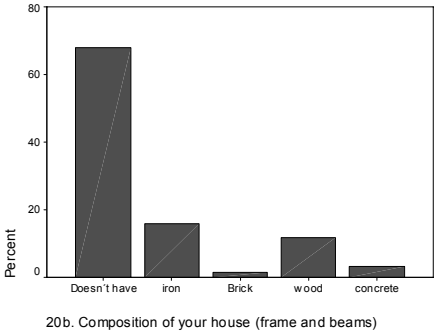

Figure 5.19 Structure of House

The answers to the question on house structure were also examined by the study by sex of interviewees and their preferences.

5.1.19. Reconstruction Need of Houses

There are 56.7 percent of men and 64.4 percent women who think total reconstruction of house is needed.

Table 5.22 Reconstruction Need of House

	Men (percent)	Women (percent)
Total Reconst.	56.7	64.4
Partial Reconst.	13.3	12.6
Little reconst.	23.3	20.9
No answer	6.7	2.1
Total	100.0	100.0

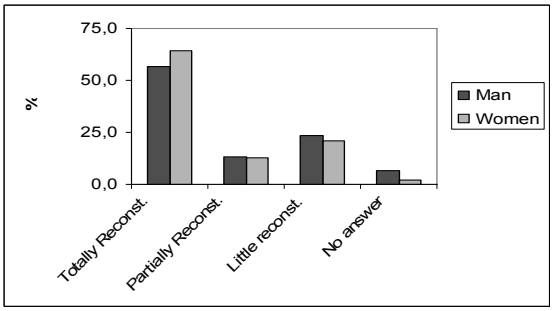

Figure 5.20 Reconstruction Need of House

5.1.20. Rebuilding

A large majority of interviewees (94.1 percent) answered that they can rebuild their houses on the same land.

Table 5.23 Rebuilding on Same Land

	Number	Percent
Yes	208	94.1
No	13	5.9
Total	221	100.0

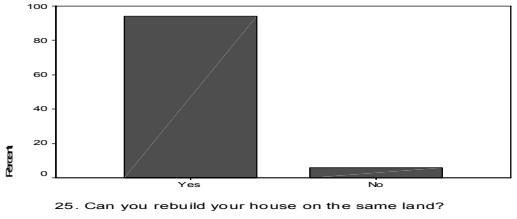

Figure5.21 Rebuilding on Same Land

On the other hand, 3.3 percent of men and 6.3 percent of women think they need a new place for reconstruction.

Table 5.24 Rebuilding on Same land

	Men (percent)	Women (percent)
Yes	96.7	93.7
No	3.3	6.3
Total	100	100.0

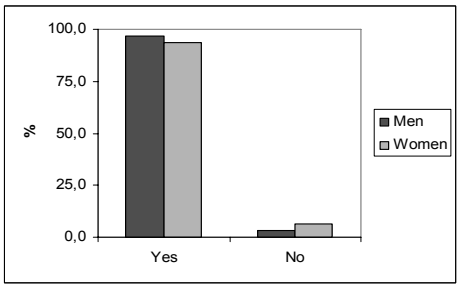

Figure 5.22 Rebuilding on Same Land

5.1.21. What is Needed for Rebuilding?

A high percentage of those interviewed (87.8 percent), male and female, think the one thing most needed for rebuilding their houses is funds.

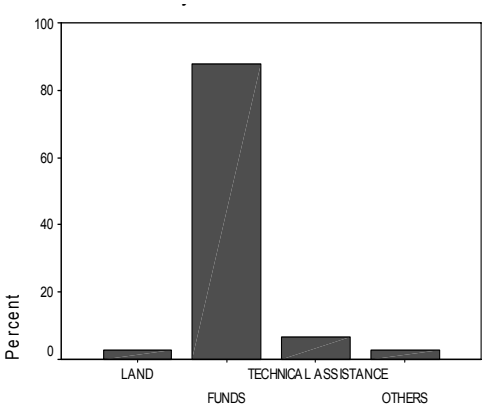

Figure 5.23 What is Needed Most for Reconstruction?

The breakdown is 86.7 percent men and 88 percent women.

Table 5.25 What is Needed Most for Reconstruction?

	Men	Women
Land	0.0	3.1
Funds	86.7	88.0
Technical assistance	6.7	6.8
Other	6.7	2.1

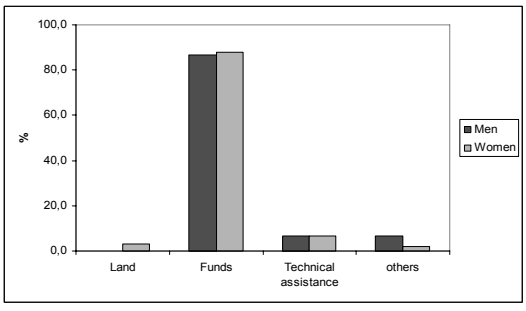

Figure 5.24 What is Needed Most for Reconstruction?

5.1.22. Preference of House

For the housing preference 88.7 percent want to reconstruct their houses by brick or confined masonry.

Table 5.26 Type of House

	Number	Percent
Adobe	4	1.8
Brick	196	88.7
Concrete	19	8.6
Other	2	0.9
Total	221	100.0

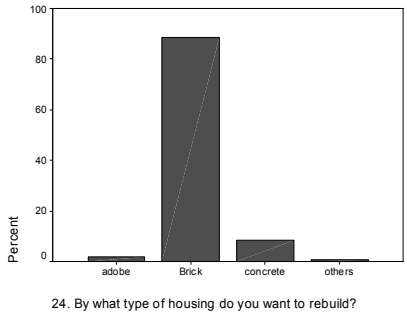

Figure 5.25 Type of House

On the other hand, 9.9 percent of women want concrete for their new houses.

Table 5-27 Type of House by Sex

	Man	Women	
Adobe	3.3	1.6	4,0
Brick	93.3	88.0	196,0
Concrete	0.0	9.9	19,0
Other	3.3	0.5	2,0
percent of Total	13.6	86.4	100,0

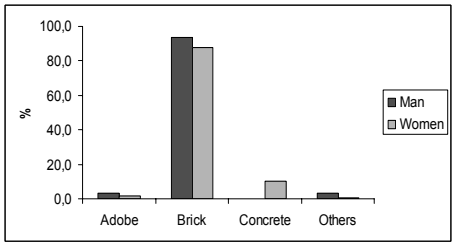

Figure 5.26 Type of House by Sex

5.1.23. Facility Demand of New House

Overall, the highest demand of the new houses was for more rooms (60 percent) and a sewage system (50 percent). Result details in tables and graphs including break down by sex for facility demand are shown below.

a. More Rooms

More than half of interviewees (59.3 percent) would like to have more rooms.

Table 5.28 Facility Demand of New House (rooms)

More rooms	Number	Percent
Yes	131	59.3
No	90	40.7
Total	221	100.0

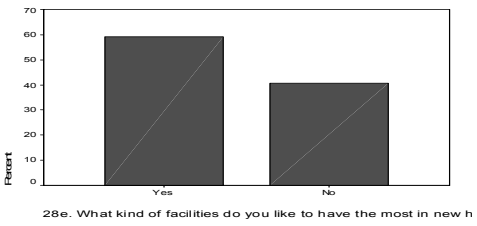

Figure 5.27 Facility Demand of New House (rooms)

The percentage of women that answered they would like to have more rooms is higher than that of men by 3 percent.

Table 5.29 Facility Demand of New House (more rooms)

More rooms	Men	women
Yes	56.7	59.7
No	43.3	40.3
Total	100.0	100.0

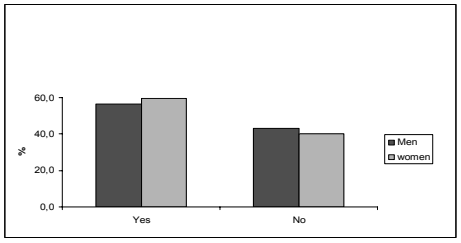

Figure 5.28 Facility Demand of New House (more rooms)

b. Electricity

There are more women than men who would like to have electricity, a difference of 8.1 percent.

Table 5.30 Facility Demand of New House (electricity)

Electricity	Men	Women
Yes	23.3	31.4
No	76.7	68.6
Total	100.0	100.0

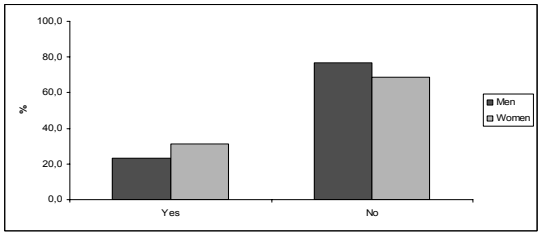

Figure 5.29 Facility Demand of New House (electricity)

c. Sewage System

The demand for sewage system is almost divided in half among interviewees.

Table 5.31 Facility Demand of New House (sewage system)

Sewage	Number	Percent
Yes	111	50.2
No	110	49.8
Total	221	100.0

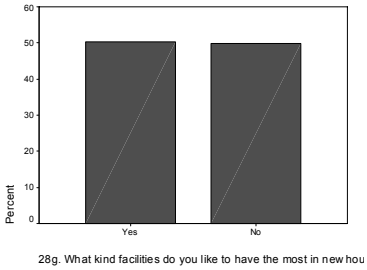

Figure 5.30 Facility Demand of New House (sewage system)

The answers are almost the same by sex.

Table 5.32 Facility Demand of New House (sewage)

Sewage	Men	Women
Yes	50.0	50.3
No	50.0	49.7
Total	100.0	100.0

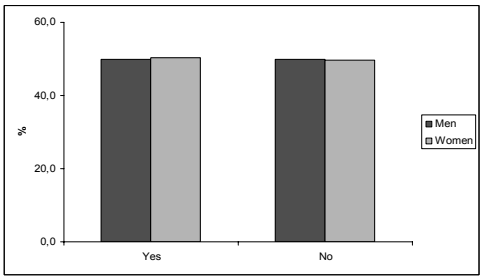

Figure 5.31 Facility Demand of New House (sewage system)

d. Water Supply

There are more men than women who think water is essential by 4.9 percent.

Table 5.33 Facility Demand of New House (water)

Water	Men	Women
Yes	46.7	41.9
No	53.3	58.1
Total	100.0	100.0

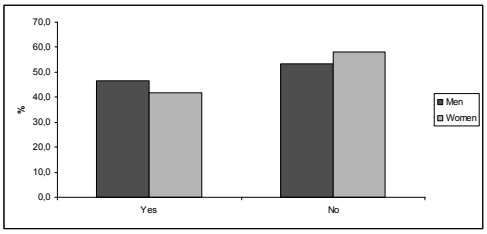

Figure 5.32 Facility Demand of New House (water)

5.1.24. Constructor

Those who were interviewed prefer their houses to be constructed by mason (50.2 percent).

Table 5.34 Constructor (mason)

Mason	Number	Percent
Yes	111	50.2
No	110	49.8
Total	221	100.0

Table 5.35 Who is going to build the house?

	Men	Women	Average
Building Company	20,0	23.6	21.8
Relatives	26.7	17.8	22.3
Mason	53.3	55.0	54.3
Oher	0.0	1.6	0.8
Construction Engineer	0.0	1.6	0.8
NGO	0.0	0.5	0.25
Total	100.0	100.0	100

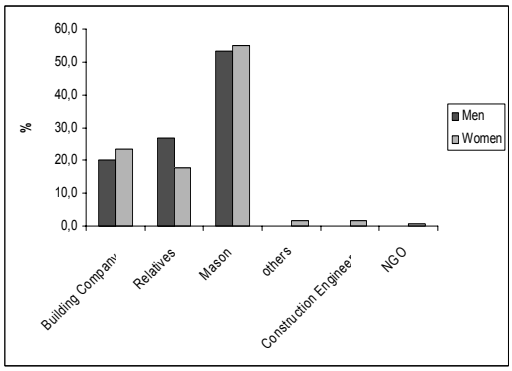

Figure 5.33 Who is going to build the house?

5.1.25. Building Permit Process

A high percentage of those interviewed (74.2 percent) does not know how to apply for a building permit at municipality.

Table 5.36 Can You Prepare Building Permit Application by Yourself?

	Number	Percent
Yes	57	25.8
No	164	74.2
Total	221	100.0

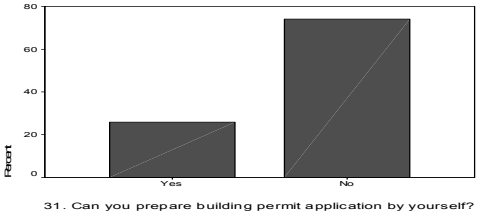

Figure 5.34 Can You Prepare Building Permit Application by Yourself?

Men think they can prepare the building permit by themselves more than women by 4.9 percent.

Table 5.37 Can You Prepare Building Permit Application by Yourself?

	Men	Women
Yes	30.0	25.1
No	70.0	74.9
Total	100.0	100.0

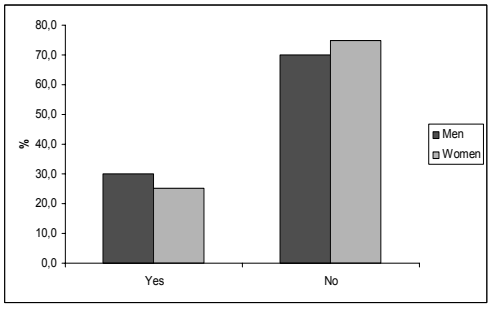

Figure 5.35 Can You Prepare Building Permit Application by Yourself?

5.1.26. Orientation

About 74 percent want orientation by municipality for the building permit process.

Table 5.38 Orientation for the Permit Process

	Number	Percent
Municipality orientation	164	74.2
Training	6	2.7
Other	8	3.6
No answer	43	19.5
Total	221	100.0

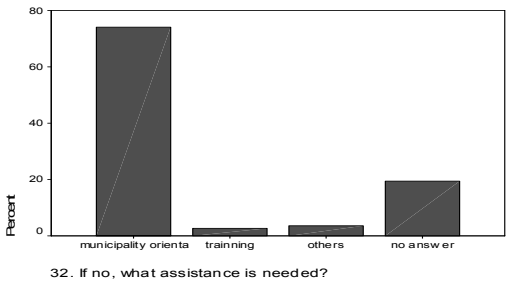

Figure 5.36 Orientation for the Permit Process

5.2. Livelihood

The survey has also investigated the livelihoods of the affected population. Results of the survey showed livelihoods of the population are in a very difficult condition.

It has been more than eight months since the deadly earthquake. Most of the Internally Displaced People (IDP) camps are already closed and the people have returned to their original place of living. There are those who decided not to occupy their old houses, and there are people who moved back to their houses even though these were damaged. But most of the affected population has returned to their homes after clearing up debris from the earthquake and getting some shelter materials to rehabilitate the damaged houses. There was no significant change in the number of persons living in houses before and after the earthquake, which is now 5.71 slightly reduced from 5.79 of the pre-earthquake times owing to the damage to the houses. There seems to be no migration happening from the earthquake affected area to other parts of the country for better living or income opportunity.

5.2.1. Eating Less

Of the people interviewed, 81.9 percent answered they are eating less than pre- earthquake times. This figure is very high and worrisome because the situation may lead to malnutrition among population and affect children's growth. Surprisingly, income of the affected population has not changed from before the earthquake due to the warm weather. In fact, there is more farm work than last year, contributing to an increase in income than the same time last year.

Table 5.39 Eating Less

	Number	Percent
Yes	40	18.1
No	181	81.9
Total	221	100.0

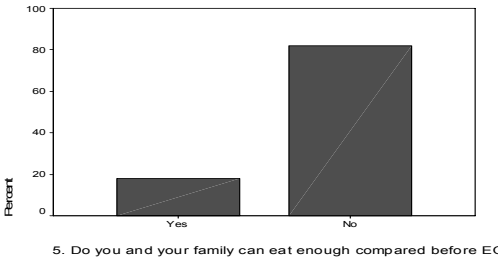

Figure 5.37 Eating Less

5.2.2. Reason for Eating Less

The reasons for eating less are related to less income, according to 32.1 percent of those interviewed. And 73.3 percent attribute it to increase in price of food. Their income has not changed but their purchasing power became weaker to buy food. The seasonal fluctuation of income is very large for the earthquake affected people because they are working mainly in the farm as a daily laborer. Their economic situation will become worse when the region enters winter and farm activities slow down.

Table 5.40 Reason for Eating Less (income)

	Number	Percent
Yes	71	32.1
No	150	67.9
Total	221	100.0

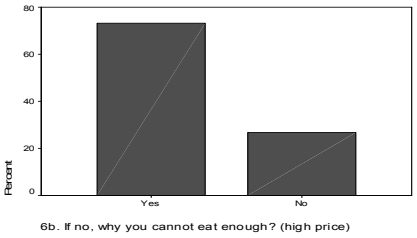

Figure 5.38 Reason for Eating Less (high price of food)

5.2.3. Health

Another striking result is the need for health and psychological care. A high 91 percent of interviewees claim their health conditions are worse than pre-earthquake.

Table 5.41 Health Condition

	Number	Percent
Good	6	2.7
Bad	201	91.0
Same	14	6.3
Total	221	100.0

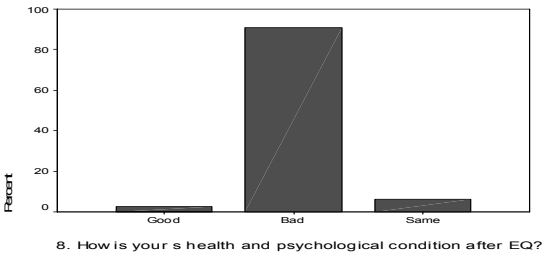

Figure 5.39 Health Condition

5.2.4. Psychological Problem

Also, 91 percent claim they are suffering from psychological deficiency, such as trauma and anxiety. This is a very high incidence and needs to be addressed as soon as possible.

Table 5.42 Reason for Health Problem

	Number	Percent
Medical problems	6	2.7
Psychological problems	201	91.0
None	14	6.3
Total	221	100.0

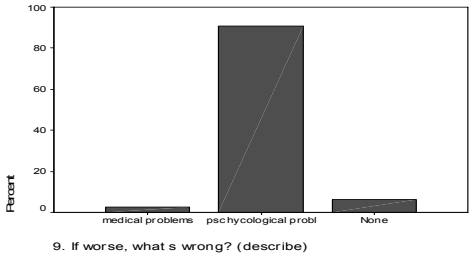

Figure 5.40 Reason for Health Problem

5.2.5. Water Supply

About 60 percent answered that water supply has not changed after the earthquake. But 38.9 percent answered that water supply is not sufficient. It seems people are suffering from water scarcity, which could be a chronic condition considering Ica region is an arid area where water supply is dependent upon the underground supply.

Table 5.43 Insufficient Water Supply

	Number	Percent
Yes	86	38.9
No	135	61.1
Total	221	100.0

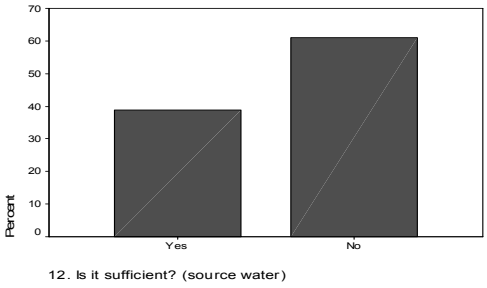

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Figure 5.41 Insufficient Water Supply

5.2.6. Fuel

For the fuel, majority of the people are using gas for fuel. However, use of firewood has increased from 7.2 percent to 17.2 percent after the earthquake. It indicates that their income has reduced and they can no longer afford to buy gas even though they say using gas is sufficient for their energy needs.

Table 5.44 Fuel Type Before EQ

	Number	Percent
Gas	197	89.1
Kerosene	7	3.2
Electricity	1	0.5
Timber	16	7.2
Total	221	100.0

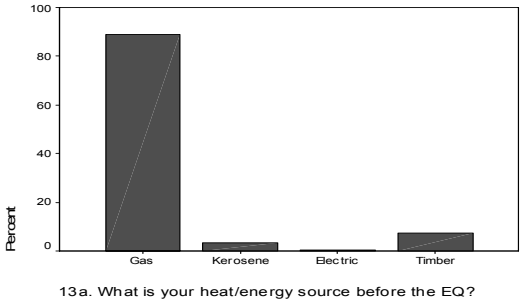


Figure 5.42 Fuel Type before EQ

Table 5.45 Fuel Type After EQ

	Number	Percent
Gas	175	79.2
Kerosene	7	3.2
Electricity	1	0.5
Timber	38	17.2
Total	221	100.0

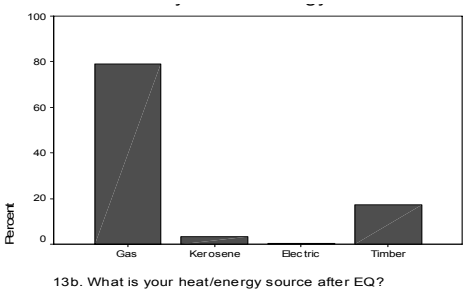


Figure 5.43 Fuel Type after EQ

5.2.7. Loss of Property

Most of the population lost electronic appliances (49.8 percent) and tableware (33 percent), apart from the house damaged by the earthquake.

Table 5.46 Earthquake Loss (electronic appliances)

	Number	Percent
Yes	110	49.8
No	111	50.2
Total	221	100.0

Table 5.47 Earthquake Loss (tableware)

	Number	Percent
Yes	73	33.0
No	148	67.0
Total	221	100.0

5.3. Reconstruction of Houses

5.3.1. Slow Progress

In this section, some environment which is surrounding the reconstruction of houses is examined. During this survey, the survey teams witnessed very few reconstruction activities in the earthquake affected region. Rubbles were cleared. Potholes were filled. The townships look very quiet. But major reconstruction work which will benefit the local economy and poor affected population in the earthquake area does not exist. So, on the matter of house reconstruction, 97.3 percent of houses need some kind of repair and 63.3 percent need to be totally reconstructed. However, even with these facts, the survey teams could not identify reconstruction work of houses in the survey area by the affected people themselves. Work was done only by religious groups for their worshippers. The delay of disbursement of BONO 6000 is one of the factors. Of the people interviewed, 95.9 percent have not received Bono yet. Only 11 households, or 5 percent of the 221 interviewed, received BONO. And only one household used that money for its intended purpose of house reconstruction. Other 10 households that received BONO have either bought materials or done nothing after receiving BONO.

Table 5.48 BONO Received

-

	Number	Percent
Not received	211	95.5
Bought materials	3	1.4
Build	1	0.5
Done nothing yet	1	0.5
Under process	5	2.3
Total	221	100.0

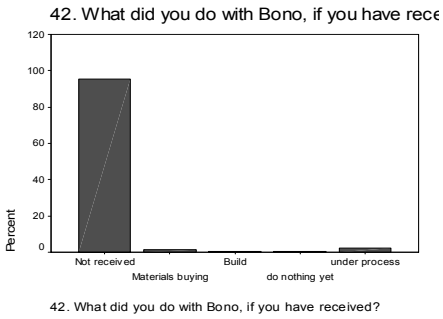


Figure 5.44 Use of BONO

5.3.2. Houses

The survey also found preconditions of the houses prior to the earthquake. The average age of houses in the affected area is 17 years old. The oldest house was constructed in 1908 and there are four houses this old based on the interview. The damage to the houses was severe: 69.7 percent of houses have damage to both ceiling and walls and the damage to 62.4 percent of houses started from walls as the ground shook. In order to reconstruct houses, the population requires financial assistance. The earthquake affected people feel that the BONO 6000 allocation is far less the required amount for house reconstruction and they think they need more access to credits and loans. An estimated 88 percent of interviewees answered that more funds is needed to reconstruct or repair their houses, 82 percent also think they do

not have enough information on assistance scheme and 97 percent demand more information on it.

Table 5.49 Need More Info on Support Program

	Number	Percent
Yes	215	97.3
No	6	2.7
Total	221	100.0

5.3.3. Source of Assistance 1

Almost all the interviewees (98.2 percent) want technical assistance, and 71.9 percent want assistance in masonry. And the reason given is that there should be better trained mason.

Table 5.50 Need Technical Assistence

	Number	Percent
Yes	217	98.2
No	4	1.8
Total	221	100.0

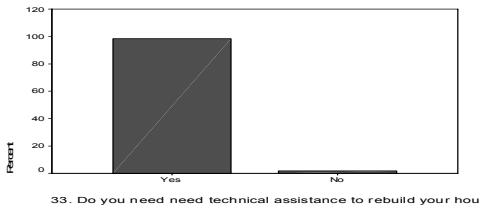


Figure 5.45 Need Technical Assistance

5.3.4. Assistance Source 2

According to the survey results, 43.4 percent of interviewees think they can get technical assistance from municipality, but 21.7 percent do not know where they can get assistance.

Table 5.51 Source of Technical Assistance

	Number	Percent
Municipality	96	43.4
Building Company	47	21.3
Other	30	13.6
Don´t know	48	21.7
Total	221	100.0

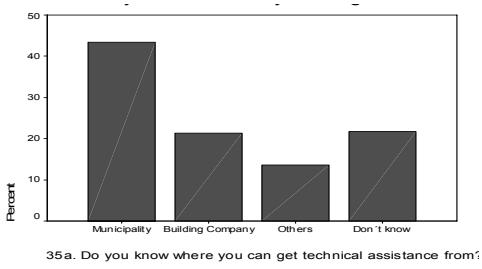


Figure 5.46 Source of Technical Assistance

5.3.5. Supervision of Construction

Regarding the question of construction supervision, 58.8 percent said there is someone who will supervise the construction and 41.2 percent said there is no one who will supervise the construction.

Table 5.52 Supervision of Construction

	Number	Percent
Yes	130	58.8
No	91	41.2
Total	221	100.0

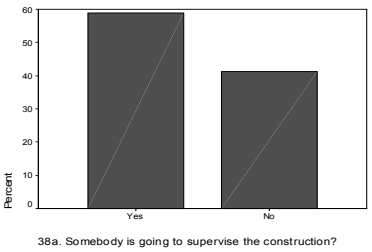


Figure 5.47 Supervision of Construction

5.3.6. Interest on Earthquake-Resistant House

All those interviewed want to make their house earthquake resistant but only 28.5 percent can afford to pay the extra cost for the additional work. However, when they were asked for actual rate of the increased cost rate, the combined rate of willingness dropped as low as 7.2 percent.

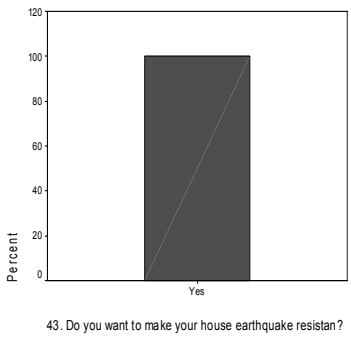


Figure 5.48 Earthquake Resistant House

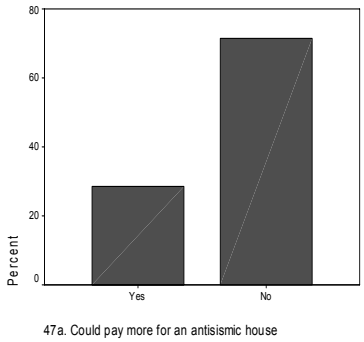


Figure 5.49 Can Pay for Extra Cost?

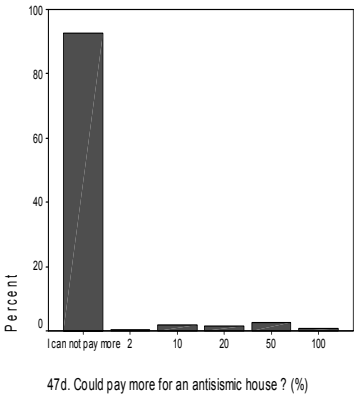


Figure 5.50 Willingness to Pay for Extra Cost (actual rate)

5.4. Workshops

The survey teams have conducted a total of 11 workshops in seven Districts of Ica Region for the affected populations and one workshop for District officials and Regional officials. Even though it was announced that the study was not intended to promise any assistance in the future but to collect people's needs and issues for reconstruction of houses, the affected populations' expectation was so high that it became necessary to limit the number of participants by selecting the participants by the populations' agreement. The participants of these workshops were from mothers support groups/ organizations (Milk Club, mothers club) and occupational groups (fishermen, farm workers, casual laborers).

The main theme of workshops is to identify problems that affected populations are facing for the reconstruction of houses. "Why We Cannot Reconstruct Our Houses?" was the title of the workshops. Through the participatory approach, participants had group discussions to discuss problems and solutions for reconstruction of houses.

The workshop was divided into four sessions. The topic of the first session was: What is the problem blocking to rebuild your house? This session was to find out what problems are preventing them from having their houses rebuilt. Through this session, participants will be able to prioritize the problems to be solved and find correcting measures which will contribute to draw pilot projects that would be implemented in the next stage of the study. Second session of the workshop was to find out their solutions to the problems identified in the first session, in order to deal with those problems. Main point of this session was for participants to come up with realistic and viable solutions. Third session is to find out who can help them. Fourth session was to draw a design of the house they want to reconstruct so that the study can understand the people's ideas of what they are willing to do and really need for the new house to be reconstructed. It will also help to have a drawing of the model of a reconstructed house.

5.4.1. Results of the Workshops

From the workshops held in seven districts in three provinces, the participants from the local community who are affected by the earthquake have identified many problems slowing down the process of their reconstruction of houses. They had group discussions to examine their current environment and to discuss the way to solve them. These problems which were raised by participants can be categorized into three areas: economic, socio-political and the government related, and external problems. For economic problems, affected populations are mainly suffering from sluggish economy after the earthquake, leading to low income, high price of food, increasing price of construction materials and labor cost for construction. And for socio-political problems, people have identified problems such as lack of land rights, house registration, delay in disbursement of Bono and its long process, less or no access to financial schemes such as bank loans, and lack of information on procedures of the

government assistance. External factors of the problems are damage in infrastructure, lack of water for construction, poor health and bad catch of fish (Tambo de Mora).

Workshop participants also discussed solutions of those problems which were identified in the previous session. In the tables below, these problems and solutions were listed. Finally, participants in the workshops were divided into groups and each group was asked to design a house they would want to reconstruct.

5.4.2. Survey Questionnaire

A questionnaire was prepared to investigate the needs and problems of the earthquake victims. In total, 47 questions were asked to the stakeholders.

Volume 2

Appendix

APPENDIX 1

QUESTIONNAIRE SHEET OF INTERVIEW SURVEY

Stakeholder Survey Questionnaire

Place	Date	Interviewer		
Name				
Age	M/F	Marital Status	Occupation	
Condition of the House:		Fully Damaged	Partially Damaged (repairable	
House makeup	kitchen/dining/___bedrooms/bath/toilet/other			
Construction Date: / /		Constructed by		
Owner of the house:		Owner of the land:		Rent per month (S/
Land registration date: /		Bono received date: / /		

1	**Livelihood**	
	1	How many families/households live in the house?
	2	How many people live in the house? M F
	3	Who has income in the family and what is it? (describe)
	4	What was your family's monthly income before EQ? After EQ?
	5	Do you and your family eat enough compared with before EQ?
	6	If no, why can you not eat enough? (less income/high price/food unavailable/other:)
	7	What is your educational background? And your partner's? (primary/secondary/university/other:)
2	**Living condition and loss**	
	8	How is your family's health and psychological condition after EQ? (same/worse)
	9	If worse, what's wrong? (describe)
	10	What kind of assistance is needed for that person? (describe)
	11	What was your water source before EQ? After EQ?
	12	Is it sufficient?
	13	What was your heat/energy source before EQ? After EQ?
	14	Is it sufficient?
	15	What was the damage caused by EQ to your property apart from the house? (list-up)
	16	What do you want to improve the most in the current environment? (access to water/health care/house/other:)
	17	Was a family member/s injured or killed by EQ?
	18	Do you know the cause of it?
	19	Do you think there was a way to prevent it?
3	**Conditions of the house and registration**	
	20	Composition of your house
	A	Foundation – adobe/bricks/concrete/other
	B	Frame and beam- iron/bricks/wood/concrete

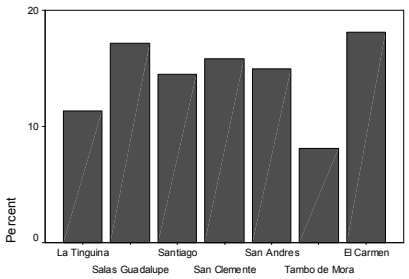
	C	Walls - Adobe/bricks/concrete/stones/quincha
	D	Roofs- wood/quincha/CGI/tile
21		What is the largest problem you need to address related to the house you live in now?
22		Where is the most damaged part of the house? (roof/wall/other:)
23		Where did the crack start during EQ? (roof/wall/other:)
4	**Rebuilding houses**	
24		By what type of housing do you want to rebuild? (adobe/bricks/concrete/stones/other:)
25		Can you rebuild your house on the same land?
26		If no, what is the reason?
27		What do you need the most to rebuild/repair your house? (land/funds/technical assistance/other:)
28		What kind of facilities do you like to have the most in new house? (Water/electricity/larger space/ventilated kitchen/more bedrooms/flush toilet/sewage/other:)
29		Can everybody in the family express an opinion for the design of the house?
30		Who is going to build the house? (construction company/yourself and family/other:)
31		Can you prepare the building permit application by yourself?
32		If no, what assistance is needed?
33		Do you need technical assistance to rebuild your house?
34		What kind of technical assistance do you need? (masonry/construction/other:)
35		Do you know where you can get technical assistance? (municipality/construction company/other:)
36		Where do you want to get technical assistance? (municipality/construction company/other:)
37		Why do you want to get technical assistance there?
38		Who is going to supervise the construction? (municipality engineer/yourself/none/other:)
39		What kind of assistance do you need to rebuild your house? (Land registration/credit/building permit/other:)
40		Do you have enough information on the support program of rebuilding houses? (Techo Propio)
41		Do you need more information on support program?
42		What did you do with Bono grant, if you have received it? (list up)
5	**Earthquake-resistant building**	
43		Do you want to make your house earthquake-resistant?
44		Are you interested in earthquake-resistant model housing?
45		Do you want advice for building an earthquake-resistant house?
46		Can you increase your budget to make the house earthquake-resistant?
47		Can you afford to increase your budget by 20 percent to introduce earthquake safer housing?
6	**Comments and Salient Findings**	

Source: JICA Study Team

APPENDIX 2

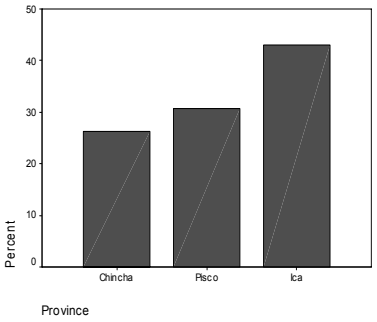
RESULT OF THE PRIMARY ANALYSIS

Place	Number	Percent
La Tinguina	25	11.3
Salas Guadalupe	38	17.2
Santiago	32	14.5
San Clemente	35	15.8
San Andres	33	14.9
Tambo de Mora	18	8.1
El Carmen	40	18.1
Total	221	100.0



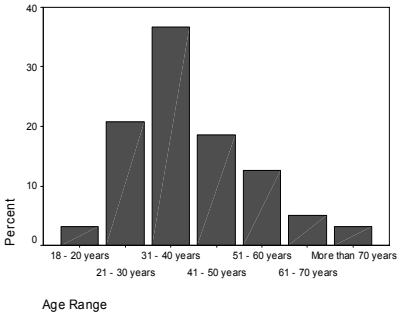
Province

	Number	Percent
Chincha	58	26.2
Pisco	68	30.8
Ica	95	43.0
Total	221	100.0



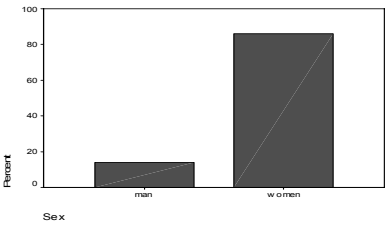
Age

	Number	Percent
18 - 20	7	3.2
21 - 30	46	20.8
31 - 40	81	36.7
41 - 50	41	18.6
51 - 60	28	12.7
61 - 70	11	5.0
More than 70	7	3.2
Total	221	100.0



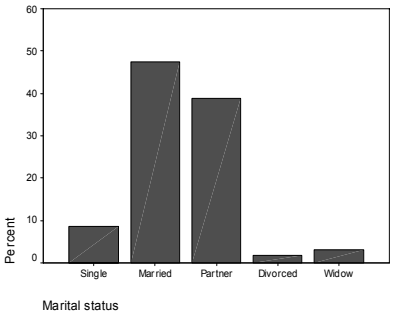
Sex

	Number	Percent
Male	31	14.0
Female	190	86.0
Total	221	100.0



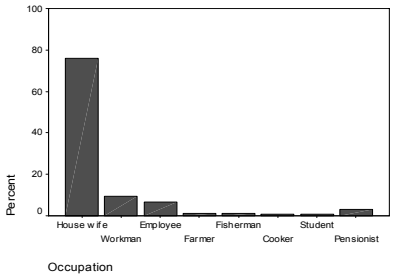
Marital status

	Number	Percent
Single	19	8.6
Married	105	47.5
Partner	86	38.9
Divorced	4	1.8
Widow	7	3.2
Total	221	100.0



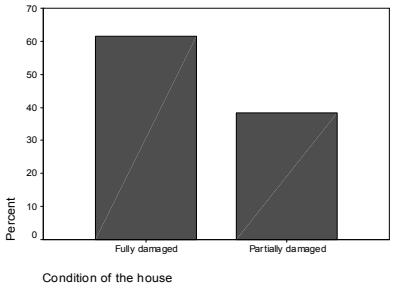
Occupation

	Number	Percent
Housewife	168	76.0
Workman	21	9.5
Employee	15	6.8
Farmer	3	1.4
Fisherman	3	1.4
Cook	2	0.9
Student	2	0.9
Pensioner	7	3.2
Total	221	100.0



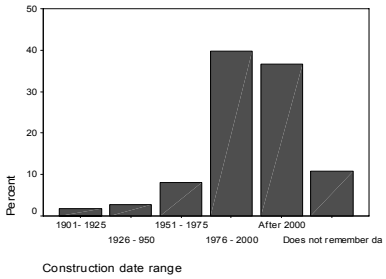
Condition of the house

	Number	Percent
Fully damaged	136	61.5
Partially damaged	85	38.5
Total	221	100.0



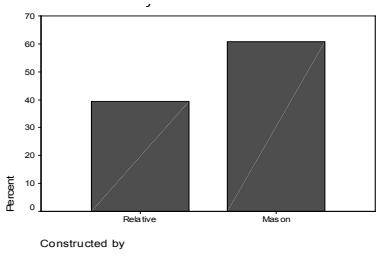
House Construction date range

	Number	Percent
1901- 1925	4	1.8
1926 - 1950	6	2.7
1951 - 1975	18	8.1
1976 - 2000	88	39.8
After 2000	81	36.7
Does not remember date	24	10.9
Total	221	100.0



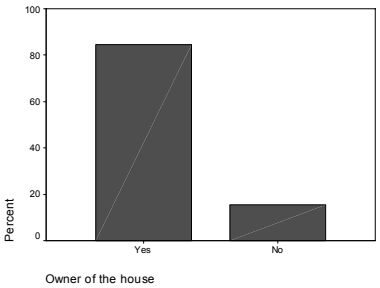
Constructed by

	Number	Percent
Relative	87	39.4
Mason	134	60.6
Total	221	100.0



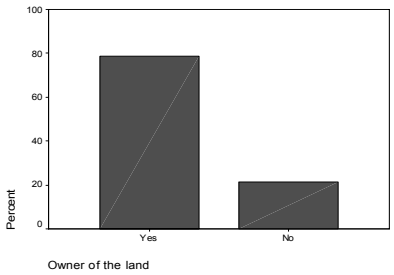
Owner of the house

	Number	Percent
Yes	187	84.6
No	34	15.4
Total	221	100.0



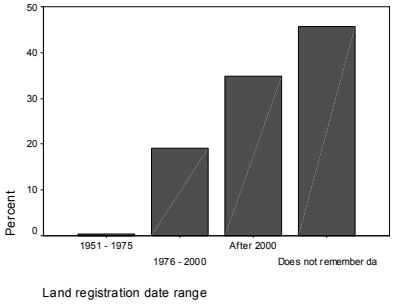
Owner of the land

	Number	Percent
Yes	174	78.7
No	47	21.3
Total	221	100.0



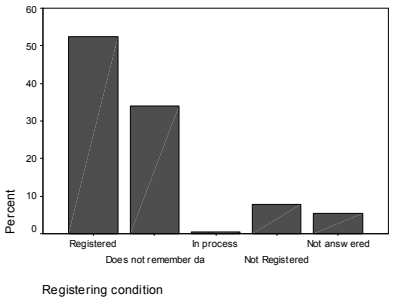
Land registration date range

	Number	Percent
1951 - 1975	1	0.5
1976 - 2000	42	19.0
After 2000	77	34.8
Does not remember date	101	45.7
Total	221	100.0



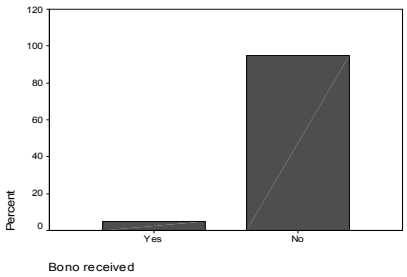
Registering condition

	Number	Percent
Registered	116	52.5
Does not remember date	75	33.9
In process	1	0.5
Not Registered	17	7.7
Not answered	12	5.4
Total	221	100.0



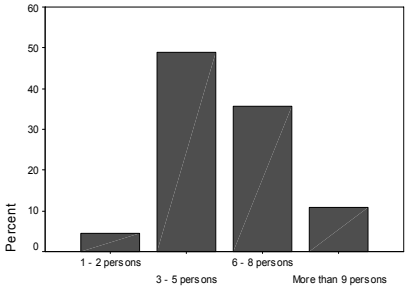
Bono received

	Number	Percent
Yes	11	5.0
No	210	95.0
Total	221	100.0



1b. How many people were living in the house before EQ (range)?

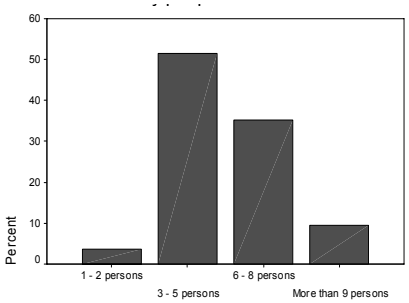
	Number	Percent
1 - 2 persons	10	4.5
3 - 5 persons	108	48.9
6 - 8 persons	79	35.7
More than 9 persons	24	10.9
Total	221	100.0



1b. How many people live in the house before EQ (range)?

1d. How many people live in the house after the EQ (range)?

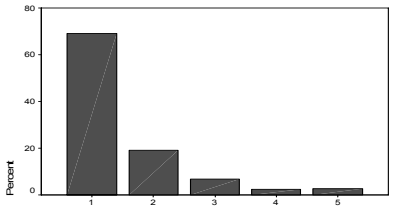
	Number	Percent
1 - 2 persons	8	3.6
3 - 5 persons	114	51.6
6 - 8 persons	78	35.3
More than 9 persons	21	9.5
Total	221	100.0



1d. How many people live in the house after the EQ (range)?

2a. How many families/households live in the house?

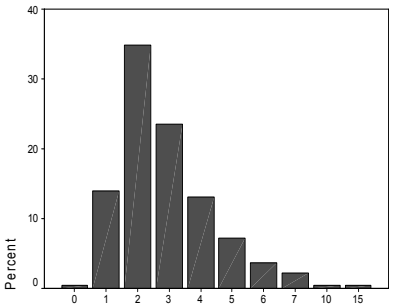
	Number	Percent
1	153	69.2
2	42	19.0
3	15	6.8
4	5	2.3
5	6	2.7
Total	221	100.0



2a. How many family/households lives in the house?

2b. F: Female members

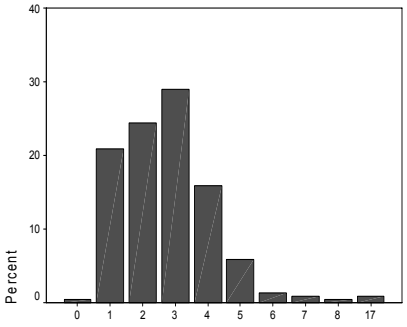
	Number	Percent
0	1	0.5
1	31	14.0
2	77	34.8
3	52	23.5
4	29	13.1
5	16	7.2
6	8	3.6
7	5	2.3
10	1	0.5
15	1	0.5
Total	221	100.0



2b. F: Women number

2c. M: Male members

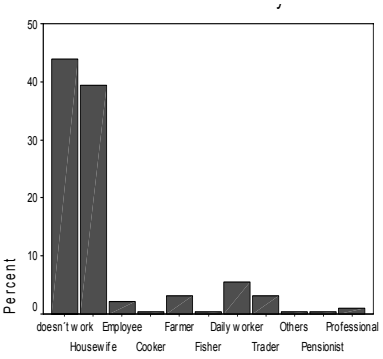
	Number	Percent
0	1	0.5
1	46	20.8
2	54	24.4
3	64	29.0
4	35	15.8
5	13	5.9
6	3	1.4
7	2	0.9
8	1	0.5
17	2	0.9
Total	221	100.0



2c. M: Men number

3a. Who has income in the family and what is it? (Women)

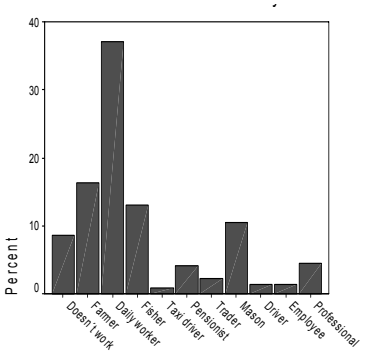
	Number	Percent
Doesn´t work	97	43.9
Housewife	87	39.4
Employee	5	2.3
Cook	1	0.5
Farmer	7	3.2
Fisher	1	0.5
Daily worker	12	5.4
Trader	7	3.2
Other	1	0.5
Pensioner	1	0.5
Professional	2	0.9
Total	221	100.0



3a. Who has income in the family and what is it? Women

3b. Who has income in the family and what is it? (Men)

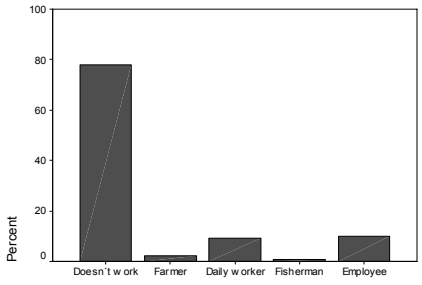
	Number	Percent
Doesn´t work	19	8.6
Farmer	36	16.3
Daily worker	82	37.1
Fisher	29	13.1
Taxi driver	2	0.9
Pensioner	9	4.1
Trader	5	2.3
Mason	23	10.4
Driver	3	1.4
Employee	3	1.4
Professional	10	4.5
Total	221	100.0



3b. Who has income in the family and what is it? Men

3c. Who has income in the family? (Son/Daughter)

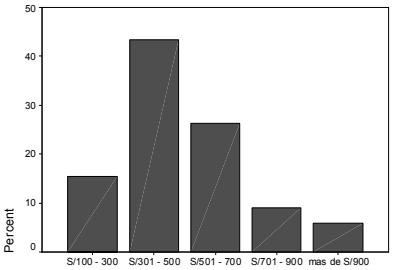
	Number	Percent
Doesn´t work	172	77.8
Farmer	5	2.3
Daily worker	20	9.0
Fisherman	2	0.9
Employee	22	10.0
Total	221	100.0



3c. Who has income in the family? Son/Daugther

4b. What was your family's monthly income before EQ? (range)

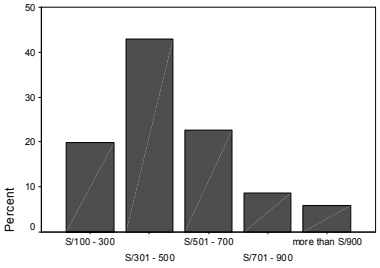
	Number	Percent
S/100 - 300	34	15.4
S/301 - 500	96	43.4
S/501 - 700	58	26.2
S/701 - 900	20	9.0
More than S/900	13	5.9
Total	221	100.0



4b. What is your family s monthly income before EQ? (range)

4d. What is your family's monthly income after EQ? (Range)

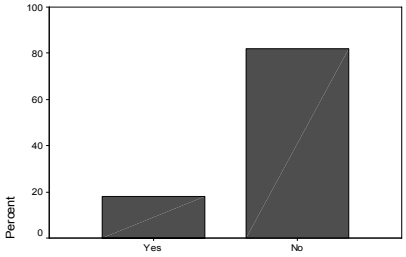
	Number	Percent
S/100 - 300	44	19.9
S/301 - 500	95	43.0
S/501 - 700	50	22.6
S/701 - 900	19	8.6
More than S/900	13	5.9
Total	221	100.0



4d. What is yours family s montly income after EQ? (Range)

5. Do you and your family eat enough compared before EQ?

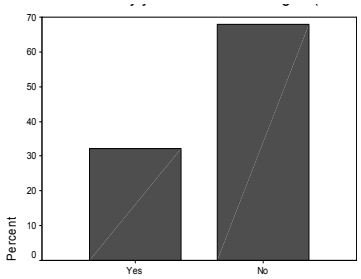
	Number	Percent
Yes	40	18.1
No	181	81.9
Total	221	100.0



5. Do you and your family can eat enough compared before EC

6a. If no, why can you not eat enough? (less income)

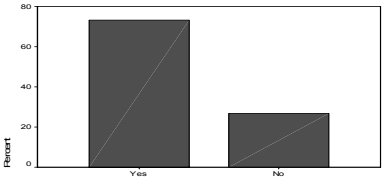
	Number	Percent
Yes	71	32.1
No	150	67.9
Total	221	100.0



6a. If not, why you cannot eat enough? (less income)

6b. If no, why can you not eat enough? (high price)

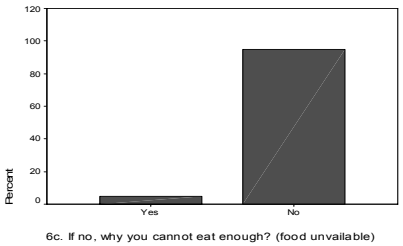
	Number	Percent
Yes	162	73.3
No	59	26.7
Total	221	100.0



6b. If no, why you cannot eat enough? (high price)

6c. If no, why can you not eat enough? (food unavailable)

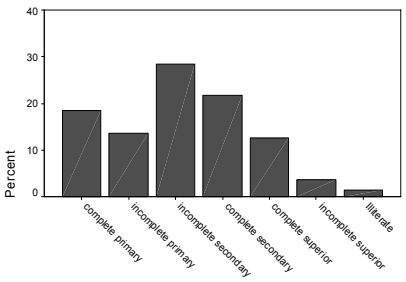
	Number	Percent
Yes	11	5.0
No	210	95.0
Total	221	100.0



6c. If no, why you cannot eat enough? (food unvailable)

7a. What is your educational background?

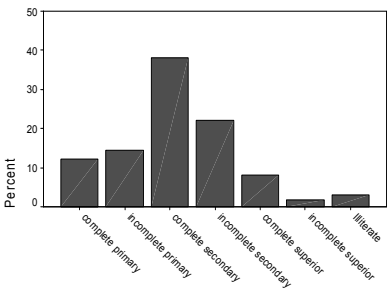
	Number	Percent
Complete primary	41	18.6
Incomplete primary	30	13.6
Incomplete secondary	63	28.5
Complete secondary	48	21.7
Complete superior	28	12.7
Incomplete superior	8	3.6
Illiterate	3	1.4
Total	221	100.0



7a. What is your your education background?

7b. What is your partner's educational background?

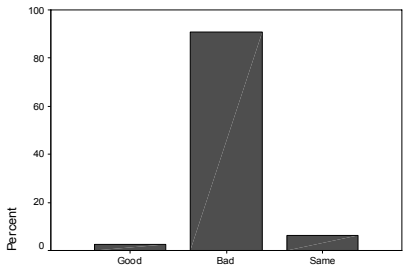
	Number	Percent
Complete primary	27	12.2
Incomplete primary	32	14.5
Complete secondary	84	38.0
Incomplete secondary	49	22.2
Complete superior	18	8.1
Incomplete superior	4	1.8
Illiterate	7	3.2
Total	221	100.0



7b. What is your partner s educatin background?

8. How is your family's health and psychological condition after EQ?

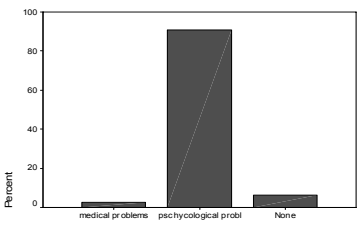
	Number	Percent
Good	6	2.7
Bad	201	91.0
Same	14	6.3
Total	221	100.0



8. How is your s health and psychological condition after EQ?

9. If worse, what's wrong? (describe)

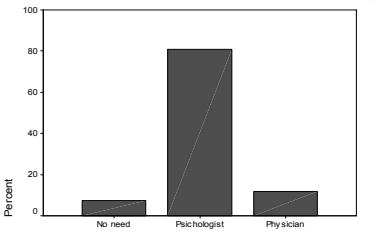
	Number	Percent
Medical problems	6	2.7
Psychological problems	201	91.0
None	14	6.3
Total	221	100.0



9. If worse, what s wrong? (describe)

10. What kind of assistance is needed for that person? (describe)

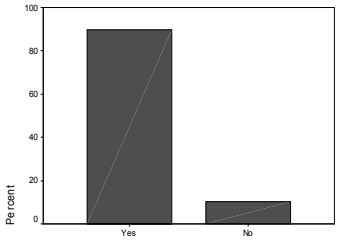
	Number	Percent
No need	16	7.2
Psychologist	179	81.0
Physician	26	11.8
Total	221	100.0



10. What kind of assistance is needed for that person? (descril

11a. Did you have water service before the EQ?

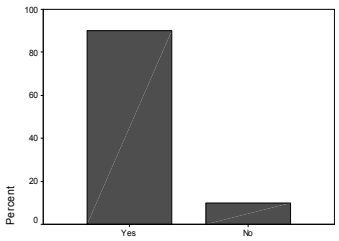
	Number	Percent
Yes	198	89.6
No	23	10.4
Total	221	100.0



11a. Do you have water service before the EQ?

11b. Do you have water service after EQ?

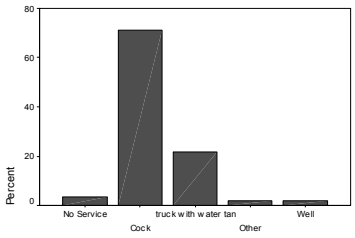
	Number	Percent
Yes	199	90.0
No	22	10.0
Total	221	100.0



11b. Do you have water service after EQ?

11c. What is your water source?

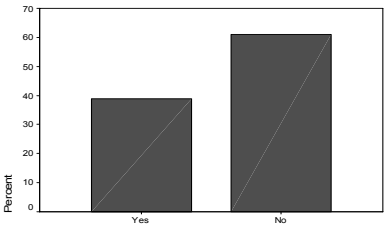
	Number	Percent
No water service	8	3.6
Cock	157	71.0
Truck with water tank	48	21.7
Other	4	1.8
Well	4	1.8
Total	221	100.0



11c. Where is your water source?

12. Is it sufficient? (water source)

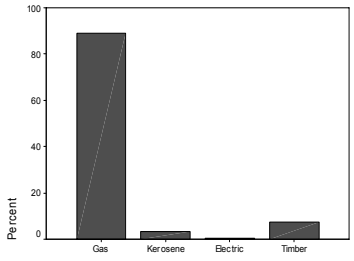
	Number	Percent
Yes	86	38.9
No	135	61.1
Total	221	100.0



12. Is it sufficient? (source water)

13a. What was your heat/energy source before the EQ?

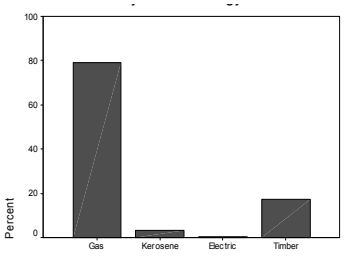
	Number	Percent
Gas	197	89.1
Kerosene	7	3.2
Electricity	1	0.5
Timber	16	7.2
Total	221	100.0



13a. What is your heat/energy source before the EQ?

13b. What is your heat/energy source after EQ?

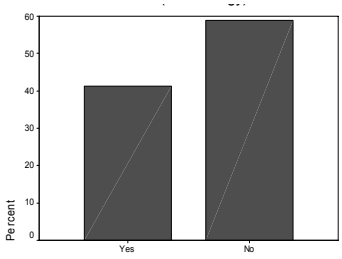
	Number	Percent
Gas	175	79.2
Kerosene	7	3.2
Electricity	1	0.5
Timber	38	17.2
Total	221	100.0



13b. What is your heat/energy source after EQ?

14.Is it sufficient? (heat/energy)

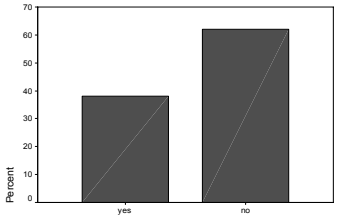
	Number	Percent
Yes	91	41.2
No	130	58.8
Total	221	100.0



14.Is it sufficient? (heat/energy)

15a. What was the damage caused by EQ to your property apart from the house? (furniture)

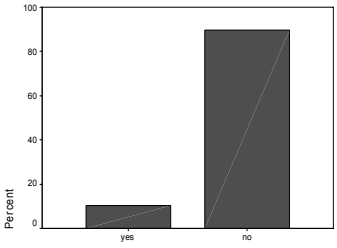
	Number	Percent
Yes	84	38.0
No	137	62.0
Total	221	100.0



15a. What is the damage caused by EQ to your property apart f

15b. What was the damage caused by EQ to your property apart from the house? (livestock)

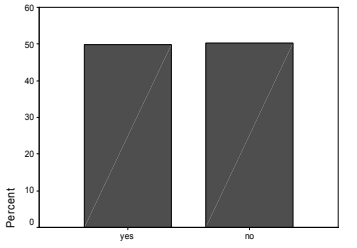
	Number	Percent
Yes	23	10.4
No	198	89.6
Total	221	100.0



15b. What is the damage caused by EQ to your property apart

15c. What was the damage caused by EQ to your property apart from the house? (electric appliances)

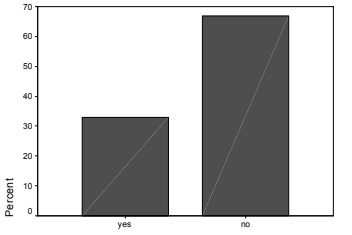
	Number	Percent
Yes	110	49.8
No	111	50.2
Total	221	100.0



15c. What is the damage caused by EQ to you property apart fr

15d. What was the damage caused by EQ to your property apart from the house? (tableware)

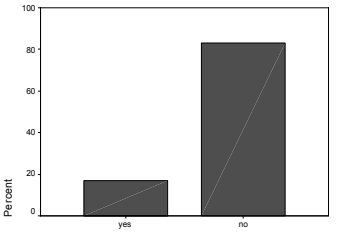
	Number	Percent
Yes	73	33.0
No	148	67.0
Total	221	100.0



15d. What is the damage caused by EQ to your property apart f

15e. What was the damage caused by EQ to your property apart from the house? (clothes)

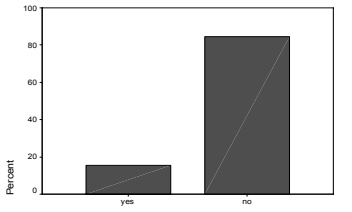
	Number	Percent
Yes	37	16.7
No	184	83.3
Total	221	100.0



15e. What is the damage caused by EQ to your property apart

15f. What was the damage caused by EQ to your property apart from the house? (Other)

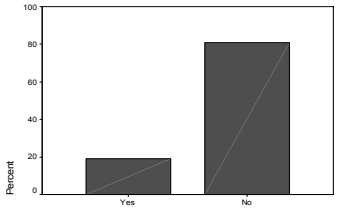
	Number	Percent
Yes	34	15.4
No	187	84.6
Total	221	100.0



15f. What is the damage caused by EQ to your property apart f

16a. What do you want to improve the most in the current environment? (access to water)

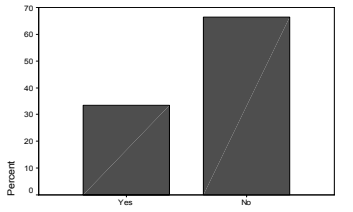
	Number	Percent
Yes	42	19.0
No	179	81.0
Total	221	100.0



16a. What do you want to improve the most in the current envir

16b. What do you want to improve the most in the current environment? (health care)

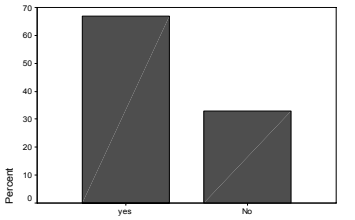
	Number	Percent
Yes	74	33.5
No	147	66.5
Total	221	100.0



16b. What do you want to improve the most in the current envirc

16c. What do you want to improve the most in the current environment? (house)

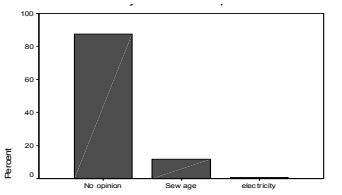
	Number	Percent
Yes	148	67.0
No	73	33.0
Total	221	100.0



16c. What do you want to improve the most in the current envirc

16d. What do you want to improve the most in the current environment? (Other)

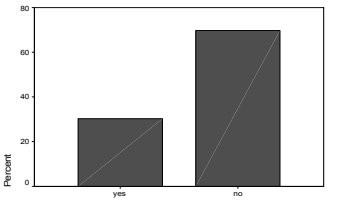
	Number	Percent
No opinion	193	87.3
Sewage	26	11.8
Electricity	2	0.9
Total	221	100.0



16d. What do you want to improve the most in the current envir

17. Was a family member/s injured or killed by EQ?

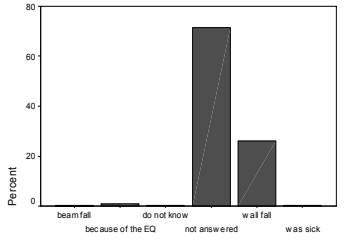
	Number	Percent
Yes	67	30.3
No	154	69.7
Total	221	100.0



17. Was your family injured or killed by EQ?

18. Do you know the cause of it?

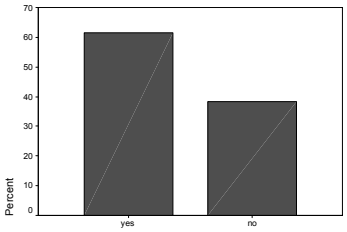
	Number	Percent
Beam fall	1	0.5
Because of the EQ	2	0.9
Do not know	1	0.5
Not answered	158	71.5
Wall fall	58	26.2
Was sick	1	0.5
Total	221	100.0



18. Do you know the reason of it?

19. Do you think there was a way to prevent it?

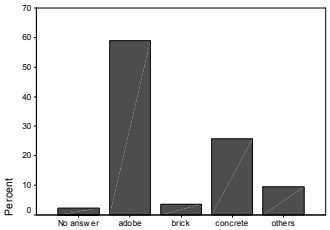
	Number	Percent
Yes	136	61.5
No	85	38.5
Total	221	100.0



19. Do you think it was a way to prevent it?

20a. Composition of your house (Foundation)

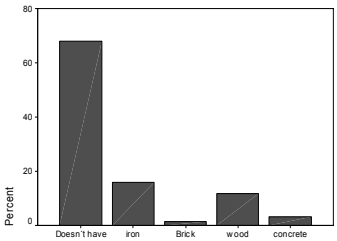
	Number	Percent
No answer	5	2.3
Adobe	130	58.8
Brick	8	3.6
Concrete	57	25.8
Other	21	9.5
Total	221	100.0



20a. Composition of your house (Foundation)

20b. Composition of your house (frame and beams)

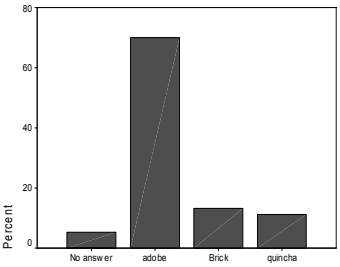
	Number	Percent
Doesn´t have	150	67.9
Iron	35	15.8
Brick	3	1.4
Wood	26	11.8
Concrete	7	3.2
Total	221	100.0



20b. Composition of your house (frame and beams)

20c. Composition of your house (walls)

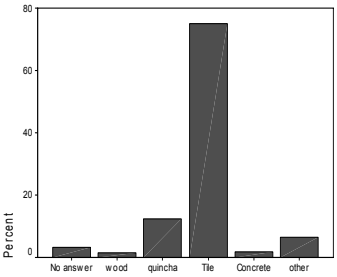
	Number	Percent
No answer	12	5.4
Adobe	155	70.1
Brick	29	13.1
Quincha	25	11.3
Total	221	100.0



20c. Composition of your house (walls)

20d. Composition of your house (roofs)

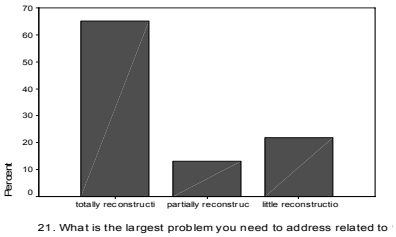
	Number	Percent
No answer	7	3.2
Wood	3	1.4
Quincha	27	12.2
Tile	166	75.1
Concrete	4	1.8
Other	14	6.3
Total	221	100.0



20d. Composition of your house (roofs)

21. What is the largest problem you need to address related to the house you live in now?

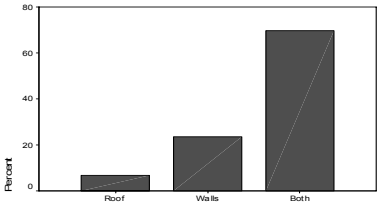
	Number	Percent
Total Reconstruction	140	63.3
Partial Reconstruction	28	12.7
Little reconstruction	47	21.3
Not answered	6	2.7
Total	221	100.0



21. What is the largest problem you need to address related to

22. Where is the most damaged part of the house?

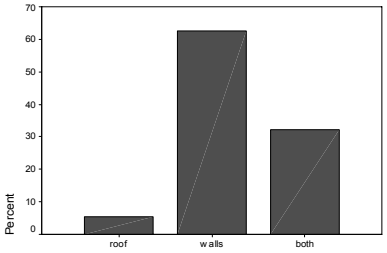
	Number	Percent
Roof	15	6.8
Walls	52	23.5
Both	154	69.7
Total	221	100.0



22. Where is the most damaged part of the house?

23. Where did cracks start during EQ?

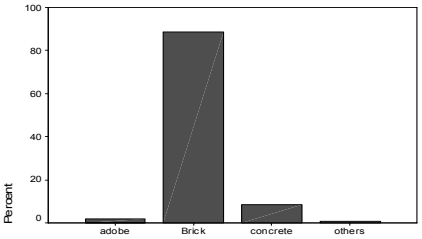
	Number	Percent
Roof	12	5.4
Walls	138	62.4
Both	71	32.1
Total	221	100.0



23. From where it started to brake during EQ?

24. What type of house do you want to rebuild?

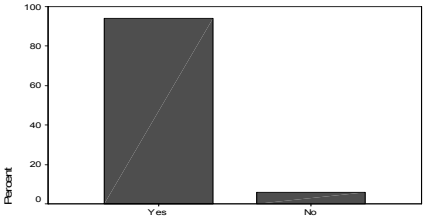
	Number	Percent
Adobe	4	1.8
Brick	196	88.7
Concrete	19	8.6
Other	2	0.9
Total	221	100.0



24. By what type of housing do you want to rebuild?

25. Can you rebuild your house on the same land?

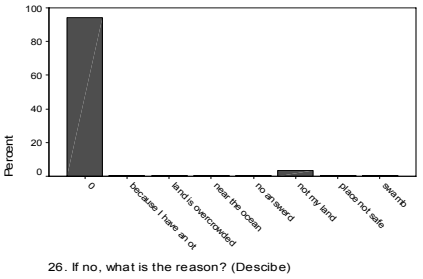
	Number	Percent
Yes	208	94.1
No	13	5.9
Total	221	100.0



25. Can you rebuild your house on the same land?

6. If no, what is the reason?

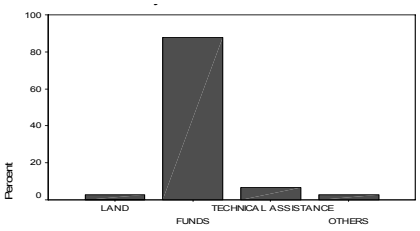
	Number	Percent
Answered yes (0)	208	94.1
Because I have another land	1	0.5
Land is overcrowded	1	0.5
Near the ocean	1	0.5
No answer	1	0.5
Not my land	7	3.2
Place not safe	1	0.5
Swamp	1	0.5
Total	221	100.0



26. If no, what is the reason? (Descibe)

27. What do you need the most to rebuild/repair your house?

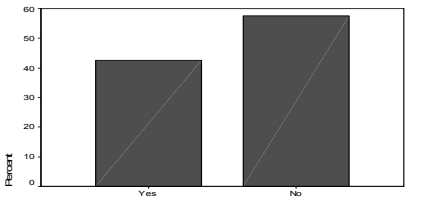
	Number	Percent
Land	6	2.7
Funds	194	87.8
Technical assistance	15	6.8
Other	6	2.7
Total	221	100.0



27. What do you the need the most to rebuild/repair your hous

28a. What kind of facilities would you like to have the most in new house? (Water)

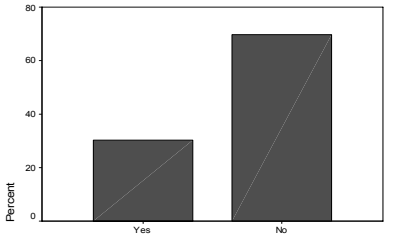
	Number	Percent
Yes	94	42.5
No	127	57.5
Total	221	100.0



28a. What kind of facilities do you like to have the most in new h

28b. What kind of facilities would you like to have the most in new house? (Electricity)

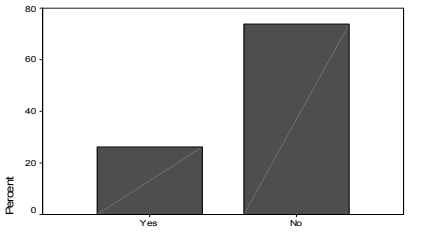
	Number	Percent
Yes	67	30.3
No	154	69.7
Total	221	100.0



28b. What kind of facilities do you like to have the most in new h

28c. What kind of facilities would you like to have the most in new house? (Larger Space)

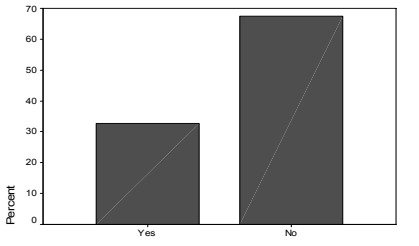
	Number	Percent
Yes	58	26.2
No	163	73.8
Total	221	100.0



28c. What kind of facilities do you like to have the most in new h

28d.What kind of facilities would you like to have the most in new house? (Ventilated Kitchen)

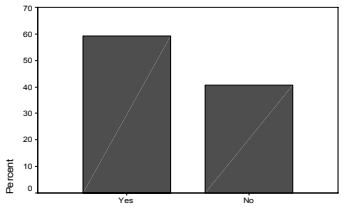
	Number	Percent
Yes	72	32.6
No	149	67.4
Total	221	100.0



28d.What kind of facilities do you like to have the most in new h

28e. What kind of facilities would you like to have the most in new house? (More bedrooms)

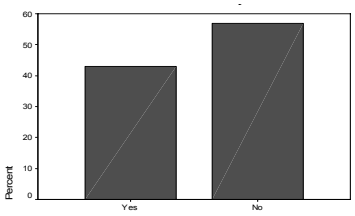
	Number	Percent
Yes	131	59.3
No	90	40.7
Total	221	100.0



28e. What kind of facilities do you like to have the most in new h

28f. What kind of facilities would you like to have the most in new house? (Flush toilet)

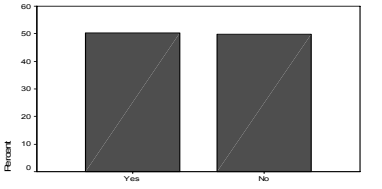
	Number	Percent
Yes	95	43.0
No	126	57.0
Total	221	100.0



28f. What kind of facilitiesdo you like to have the most in new ho

28g. What kind of facilities would you like to have the most in the new house? (Sewage system)

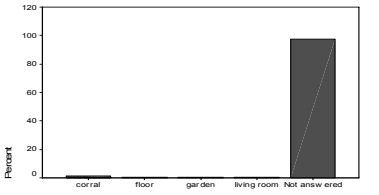
	Number	Percent
Yes	111	50.2
No	110	49.8
Total	221	100.0



28g. What kind facilities do you like to have the most in new hou

28h. What kind of facilities would you like have the most in new house? (Other)

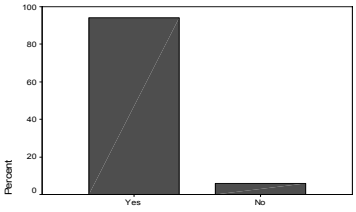
	Number	Percent
Corral	3	1.4
Floor	1	0.5
Garden	1	0.5
Living room	1	0.5
Not answered	215	97.3
Total	221	100.0



28h. What kind of facilities do you like have the most in new ho

29. Can everybody in the family express an opinion on the design of the house?

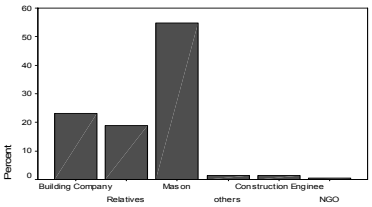
	Number	Percent
Yes	208	94.1
No	13	5.9
Total	221	100.0



29. Can everybody in the family express opinion for the design

30. Who is going to build the house?

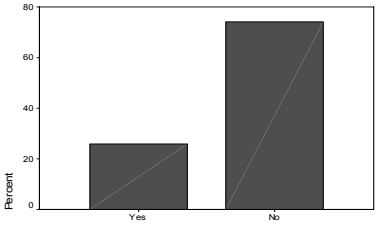
	Number	Percent
Building Company	51	23.1
Relatives	42	19.0
Mason	121	54.8
Other	3	1.4
Construction Engineer	3	1.4
NGO	1	0.5
Total	221	100.0



30. Who is going to build the house?

31. Can you prepare the building permit application by yourself?

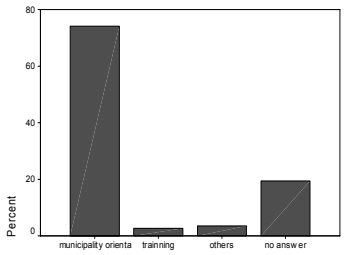
	Number	Percent
Yes	57	25.8
No	164	74.2
Total	221	100.0



31. Can you prepare building permit application by yourself?

32. If no, what assistance is needed?

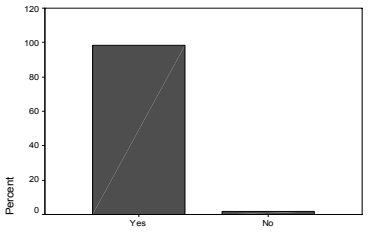
	Number	Percent
Municipality orientation	164	74.2
Training	6	2.7
Other	8	3.6
No answer	43	19.5
Total	221	100.0



32. If no, what assistance is needed?

33. Do you need technical assistance to rebuild your house?

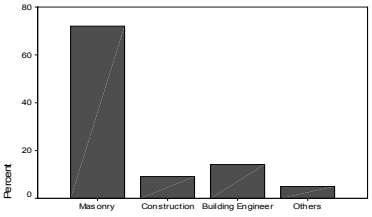
	Number	Percent
Yes	217	98.2
No	4	1.8
Total	221	100.0



33. Do you need need technical assistance to rebuild your hou

34a. What kind of technical assistance do you need?

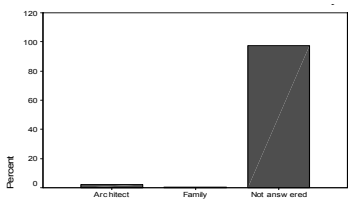
	Number	Percent
Masonry	159	71.9
Construction	20	9.0
Building Engineer	31	14.0
Other	11	5.0
Total	221	100.0



34a. What kind of technical assistance do you need?

34b. What kind of technical assistance do you need? (Other)

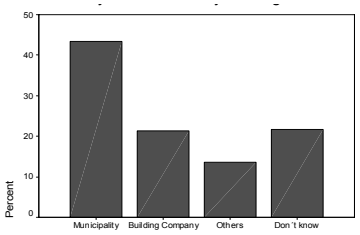
	Number	Percent
Architect	5	2.3
Family	1	0.5
Not answered	215	97.3
Total	221	100.0



34b. What kind of technical assistance do you need? (Others)

35a. Do you know where you can get technical assistance?

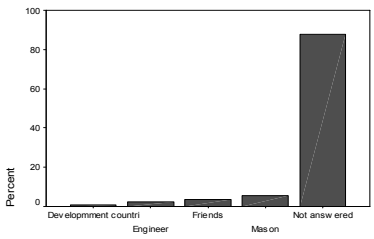
	Number	Percent
Municipality	96	43.4
Building Company	47	21.3
Other	30	13.6
Don´t know	48	21.7
Total	221	100.0



35a. Do you know where you can get technical assistance from?

35b. Do you know where you can get technical assistance from? (Other)

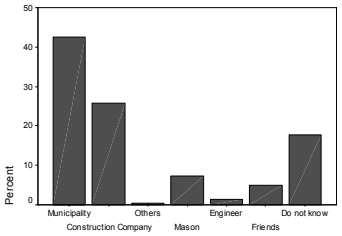
	Number	Percent
Development countries	2	0.9
Engineer	5	2.3
Friends	8	3.6
Mason	12	5.4
Not answered	194	87.8
Total	221	100.0



35b. Do you know where you can get technical assistance from

36. Where do you want to get technical assistance?

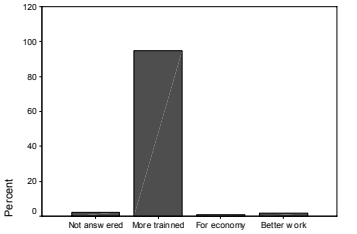
	Number	Percent
Municipality	94	42.5
Construction Company	57	25.8
Other	1	0.5
Albanil	16	7.2
Engineer	3	1.4
Friends	11	5.0
Don´t know	39	17.6
Total	221	100.0



36. Know where you want to get technical assistance

37. Why do you want that assistance from that person? (describe)

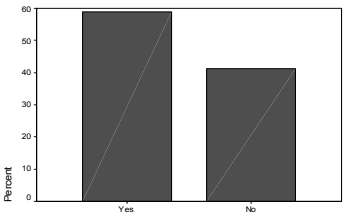
	Number	Percent
Not answered	5	2.3
More trained	210	95.0
For economy	2	0.9
Better work	4	1.8
Total	221	100.0



37. Why do you want that assistance from that person? (descri

38a. Is somebody going to supervise the construction?

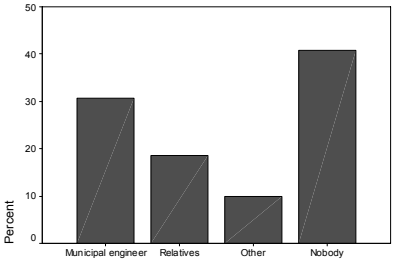
	Number	Percent
Yes	130	58.8
No	91	41.2
Total	221	100.0



38a. Somebody is going to supervise the construction?

38b. Who is going to supervise the construction?

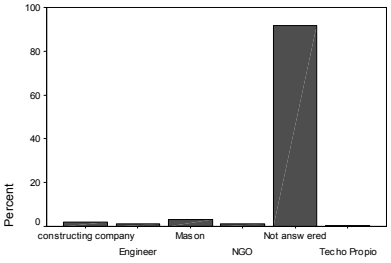
	Number	Percent
Municipal engineer	68	30.8
Relatives	41	18.6
Other	22	10.0
Nobody	90	40.7
Total	221	100.0



38b. Who is going to supervise the construction?

38c. Who is going to supervise the construction? (Other)

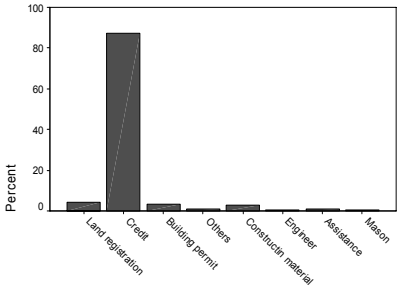
	Number	Percent
Construction company	4	1.8
Engineer	3	1.4
Mason	7	3.2
NGO	3	1.4
Not answered	203	91.9
Techo Propio	1	0.5
Total	221	100.0



38c. Who is going to supervise the construction? Others

39. What kind of assistance do you need to rebuild your house?

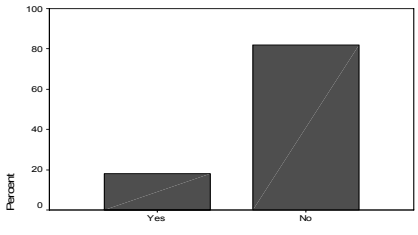
	Number	Percent
Land registration	9	4.1
Credit	193	87.3
Building permit	7	3.2
Other	2	0.9
Construction materials	6	2.7
Engineer	1	0.5
Assistance	2	0.9
Mason	1	0.5
Total	221	100.0



39. What kind of assistance do you need to rebuild your house

40a. Do you have enough information on the support program of rebuilding houses?

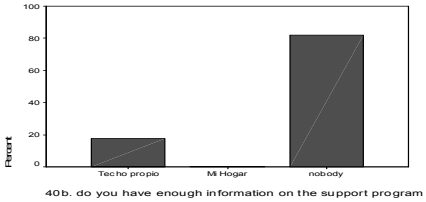
	Number	Percent
Yes	40	18.1
No	181	81.9
Total	221	100.0



40a. Do you have enough information on the support program

40b. Where do you get enough information on the support program of house rebuilding?

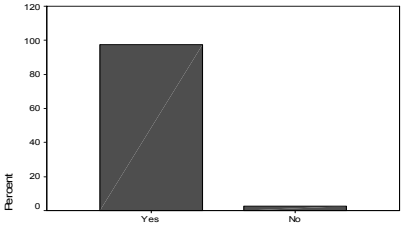
	Number	Percent
Techo propio	39	17.6
Mi Hogar	1	0.5
Nobody	181	81.9
Total	221	100.0



40b. do you have enough information on the support program

41. Do you need more information on the support program?

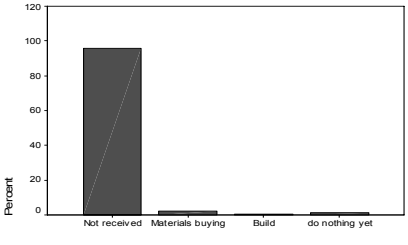
	Number	Percent
Yes	215	97.3
No	6	2.7
Total	221	100.0



41. Do you need more information on the support program?

42. What did you do with Bono grant, if you have received it?

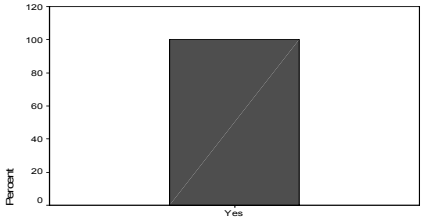
	Number	Percent
Not received	212	95.9
Buying materials	5	2.3
Build	1	0.5
Do nothing yet	3	1.4
Total	221	100.0



42. What did you do with Bono, if you have received?

43. Do you want to make your house earthquake-resistant?

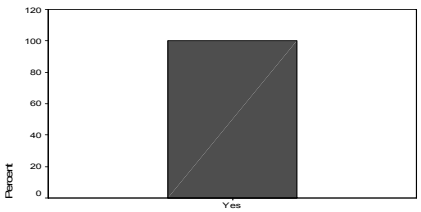
	Number	Percent
Yes	221	100.0
No	0	0.0
	221	100.0



43. Do you want to make your house earthquake resistan?

44. Are you interested in earthquake-resistant model housing?

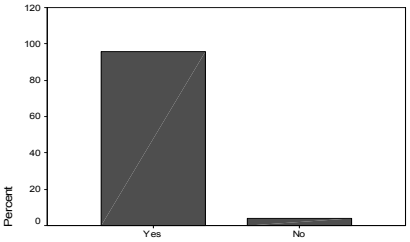
	Number	Percent
Yes	221	100.0
No	0	0.0
Total	221	100.0



44. Are you interested in earthquake resistant model housing?

45. Do you want advice for building earthquake-resistant house?

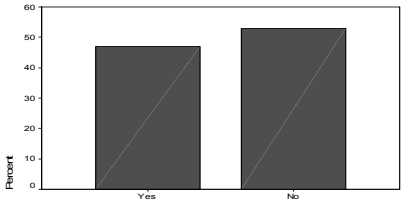
	Number	Percent
Yes	212	95.9
No	9	4.1
Total	221	100.0



45. Do you want advice for building earthquake resistant house

46. Can you increase your budget to make it earthquake-resistant?

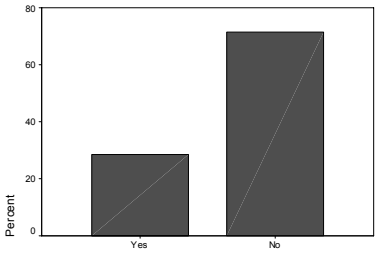
	Number	Percent
Yes	104	47.1
No	117	52.9
Total	221	100.0



46. Can increase in your budget to make it earthquake resistant

47a. Could you pay more for a safer house

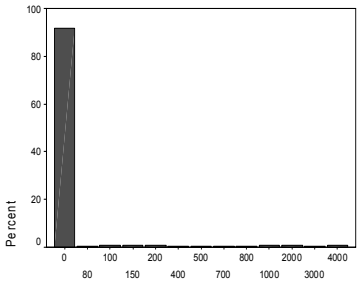
	Number	Percent
Yes	63	28.5
No	158	71.5
Total	221	100.0



47a. Could pay more for an antisismic house

47b. Could you pay more for a safer house?

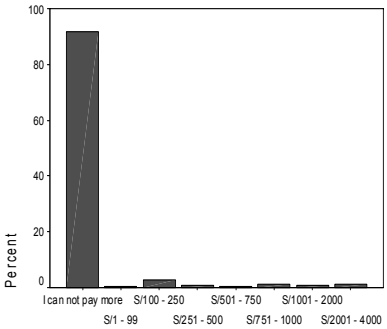
	Number	Percent
0	203	91.9
80	1	0.5
100	2	0.9
150	2	0.9
200	2	0.9
400	1	0.5
500	1	0.5
700	1	0.5
800	1	0.5
1000	2	0.9
2000	2	0.9
3000	1	0.5
4000	2	0.9
Total	221	100.0



47b. Could pay more for an antisismic house S/

47c. Could you pay more for a safer house? (range)

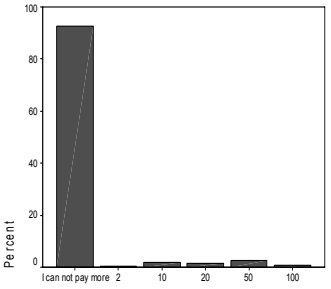
	Number	Percent
I cannot pay more	203	91.9
S/1 - 99	1	0.5
S/100 - 250	6	2.7
S/251 - 500	2	0.9
S/501 - 750	1	0.5
S/751 - 1000	3	1.4
S/1001 - 2000	2	0.9
S/2001 - 4000	3	1.4
Total	221	100.0



47c. Could pay more for an antisismic house S/? (range)

47d. Could you pay more for a safer house? (percent)

	Number	Percent
I cannot pay more	205	92.8
2	1	0.5
10	4	1.8
20	3	1.4
50	6	2.7
100	2	0.9
Total	221	100.0



47d. Could pay more for an antisismic house ? (%)

VOLUME 3

Facilitating of Safer Housing Reconstruction

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CHAPTER 1 BACKGROUND AND OBJECTIVES OF THE PILOT PROJECT 1

On 15th August 2007, a big earthquake hit the coast of Ica Region leaving in its wake a lot of victims and material damages. According to the INEI a total of 52,134 houses were collapsed as a consequence of this earthquake.

The results of the building survey, made by the JICA Study Team, reveal the quick reconstruction needs of safer housing using confined masonry to reduce also the risk of damage from future earthquakes. However, there are many victims living in poverty who cannot prepare any drawings for their safer houses.

Pilot Project 1 aims at facilitating housing reconstruction after the earthquake by preparing the prototype drawings for safer housing with confined masonry and disseminating the drawings to the victims.

CHAPTER 2 DESCRIPTION OF THE PILOT PROJECT

2.1. Target Areas

The target areas of Pilot Project 1 are the three district municipalities located at in the study area, namely Pueblo Nuevo in Chincha province, Independencia in Pisco province and La Tinguiña in Ica province.

2.2. Project Component

2.2.1. Preparation Stage

During the Pilot Project 1, several documents, drawings and dissemination materials are were prepared to facilitate the housing reconstruction. The prototype drawings for safer housing are major outputs at during the preparation stage. For the preparation of prototype drawings, minimum requirements for safer housing was studied and prepared. Besides the prototype drawings, a series of manuals and some posters were also prepared in order to make full use of and disseminate the prototype drawings.

2.2.2. Implementation Stage

Actual activities of disseminating the prototype drawings for safer housing consisted of two components: one is OJT of the prototype drawings for technical staff of the said three district municipalities, and the other is a workshop on the prototype drawings for people who will reconstruct their houses in those municipalities. The OJT and workshop were carried out by the JICA Study Team.

2.3. Principle Idea of Prototype Drawings for Safer Housing

The prototype drawings of safer housing (See Appendix 1) are directedwere guided by the following principles:

(1) Minimum requirements for safer housing (See Appendix 2)

Designs of safer housings are in conformity with minimum requirements for safer housing. The minimum requirements are essentials of design, construction and supervision of safer housing using confined masonry, which has three important aspects:

a) Quality of Materials

b) Structural Section of Main Members

c) Connection of Structural Members.

The minimum requirements were prepared by the JICA Study Team and authorized by a director of Japan-Peru Center for Earthquake Engineering and Disaster Mitigation (CISMID). (See Appendix 3)

(2) Economy

Taking the future expansion of housing into consideration, the prototype drawings for safer housing were studied based on the construction budgets of lower income class which are equivalent to BONO 6000 and/or Techo Propio BHF.

(3) Stage of extension and diversity

As a result, four prototypes of safer housing were developed. The four prototypes range from a module of a single room to a basic module of housing consisted of bed rooms, social room and service rooms. Each prototype also varied according to soil condition and availability of electricity and water/sewage.

(4) Self-construction

The construction management of the safer housing is assumed to include the self-construction method. Housing construction by the self-construction method is needed to ensure appropriate construction due to construction artisan's low level of knowledge of safer housing.

For the reason "manual of monitoring construction of safer housing" is used by house owners is in order to facilitate the fulfillment of minimum requirements for safer housing.

(5) Safety

The design of the structural elements and the dimensions/proportions of the architectonic components were determined to deal with the possibility of future earthquakes. For that purpose, the following regulations were considered:

- Regulations set forth by the National Regulation of Construction, and specifically those related to the Title III.1, Architecture, Standard A.010, General Conditions of Design; Standard A.020, House.
- Structural codes of E.010, E020, E030, E.060 and E.070.

2.4. Principal Idea of Dissemination of the Prototype Drawings for Safer Housing

The prototype drawings for safer housing were disseminated based on the following considerations and methods.

2.4.1. Required Conditions for the Dissemination

House owners, who will use the prototype drawings for safer housing, will obtain building permits. Thereafter, the property will be inspected by a municipal inspector during the construction to confirm that safer housing is being constructed.

Since the number of building permits is enormous for reconstruction, it will be hard to inspect all the construction because the municipal inspectors are few in number. Thus, complementing a shortage of the inspectors is indispensable for administering the building permit system smoothly.

The prototype drawings for safer housing are also needed to register into a project bank, which is necessary for obtaining building permits. By selecting a prototype drawing building permit applicants will be able to obtain a building permit automatically and quickly.

Accordingly, the points of disseminating the prototype drawings are key stage in the building permit procedure.

2.4.2. OJT for Technical Officers of Public Work Section in District Municipality

As mentioned above, On-the-Job-Training (OJT) is needed to instruct technical officials on how to make use of prototype drawings for safer housing. The OJT includes all the administration services in the building permit procedure, on the assumption that the project bank will be used for the registration.

2.4.3. Workshop for Ordinal People in District Municipality

The prototype drawings for safer housing will be disseminated to people who want to reconstruct their houses. A Workshop is needed for ordinal people in the districts to teach what the prototype drawings are, what a building permit is, and how to obtain the prototype drawings.

2.5. Schedule

The schedule used for implementing Pilot Project 1 is shown below.

Table 2.1 Work Schedule of Pilot Project 1

Work item	August	September	October	November
1. Study of Minimum Requirements for Safer Housing				
2. Preparation of Poster of Minimum Requirements for Safer Housing				
3. Preparation of Prototype Drawings for Safer Housing and Manual of Watching over Construction of Safer Housing (Work done by local enginnering company)				
4. Preparation of Manual of Simple Inspection for Construction of Safer Housing				
5. Preparation of Manual of Improved Building Permit for Safer Housing				
6. Preparation of Pamphlet of Prototype Drawings for Safer Housing in the Process of Building Permit				
7. Preparation of Poster of Pototype Drawings for Safer Housing				
8. OJT for technical officers of public work section in district municipality				
9. Workshop for ordinal people in district municipality				

Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

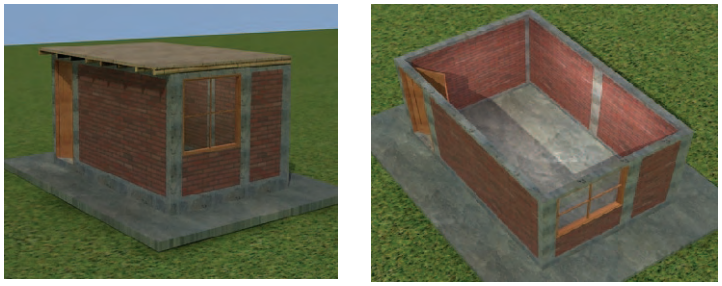
CHAPTER 3 OUTLINE OF OUTCOMES OF THE PILOT PROJECT

3.1. Prototype Drawings for Safer Housing

3.1.1. Architectural Plan

(1) Prototype 1: Construction cost of 6,000 soles (Bonus 6,000)

This type has a room which is used as bedroom, with a floor area of 16.38 m2. The future extension of the building is in the direction to rear or the left side in the front view.

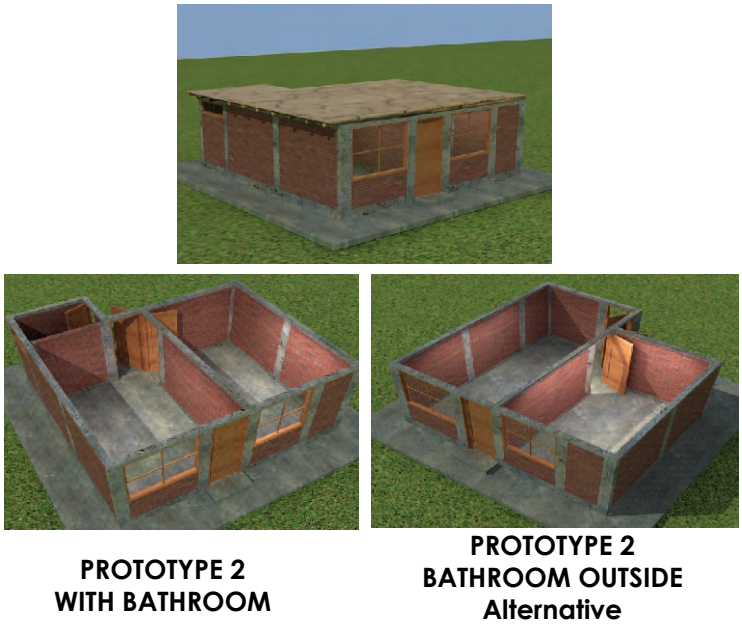


Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

Figure 3.1 Three Dimensional Image of Prototype 1

(2) Prototype 2: 13,400 soles (Techo Propio BHF)

It consists of a bedroom (the same layout of Prototype 1) and a social area, with a floor area of 35.47 m2. There are two variants; one has a bathroom in the house and the other does not. The direction of future extension is the rear in the front view.

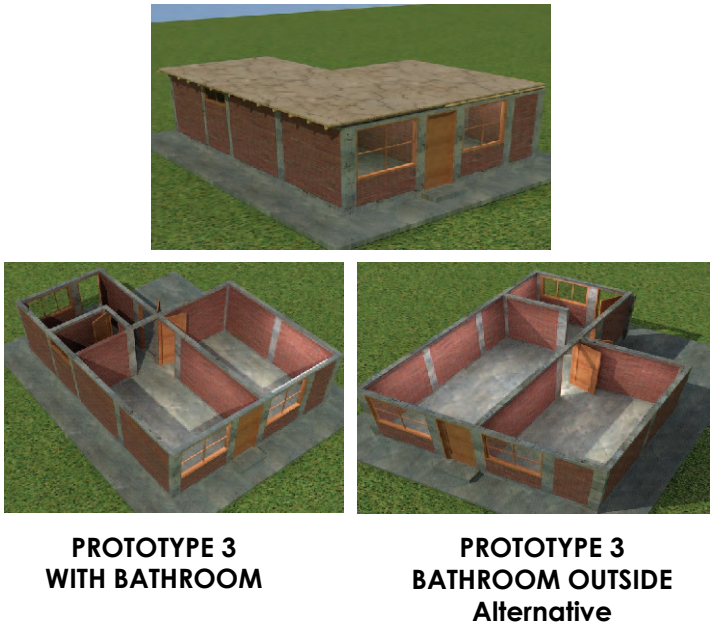


Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

Figure 3.2 Three Dimensional Image of Prototype 2

(3) Prototype 3: 16,400 soles

It consists of a bedroom and a social room (the same layout of Prototype 2) and a kitchen, with a total floor area of 43.23 m2. There are two variants; one has a bathroom in the house and the other does not. The direction of future extension is the rear in the front view.

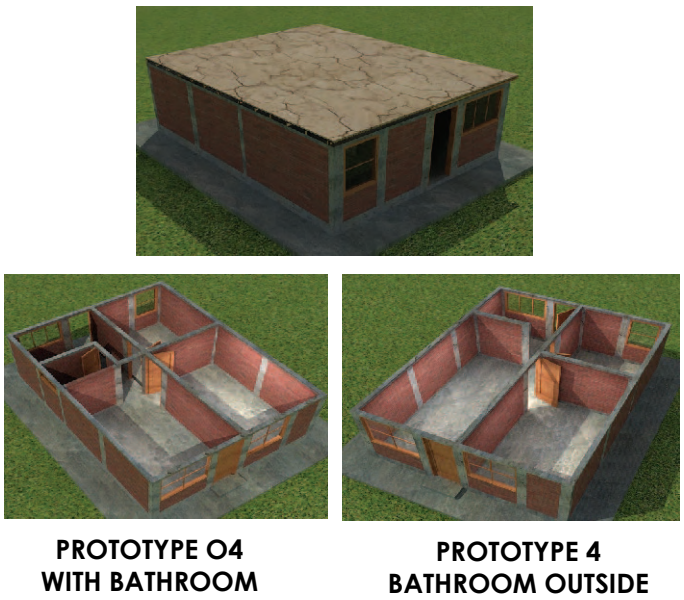


Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

Figure 3.3 Three Dimensional Image of Prototype 3

(4) Prototype 4: 19,400 soles (Bonus 6,000 plus Techo Propio BHF)

It consists of a bedroom, a social area and a kitchen (the same layout of Prototype 3) and a bedroom. It has a constructed area of 53.13 m2. There are two variants; one has a bathroom in the house and the other one does not.



Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

Figure 3.4 Three Dimensional Image of Prototype 4

In case of the prototype which has no bathroom in the house, a latrine will be constructed at the rear of the house.

3.1.2. Structural Design

(1) Outline of structural design

Structural characteristics are as follows:

- Tie beam is specified based on the kind of soil. In case of firm soil (bearing capacity of soli is 1.20 kg/cm2 or more), tie beam does not need to install steel bars as reinforcement. However, in case of weak soil (that is less than 1.20 kg/cm2), tie beam does need to install steel bars as reinforcement.
- The structural system of the prototype is confined masonry. To guarantee the confined masonry system, the confinement will be by column and ring beam.
- According to the budget of a house owner, a roofing is selected from a light concrete slab in case of sufficient budget or a mud plaster on Guayaquil cane with crushed cane in case of insufficient budget.

(2) Seismic analysis for the heaviest structure among prototype design

This is a summary of the final report of Pilot Project 1 prepared by the local engineering company contracted by the JICA Study Team (See Appendix 4).

The resistance to the seismic forces must be calculated when a building prototype drawing is designed to avoid damage in the structure or the collapse of the building. According to the national building code, the analysis methods to determinate the internal forces produced in the structural elements by seismic forces are static method and dynamic method. The dynamic method is the "combination modal of spectral analysis" and the "time-history analysis". Time-history analysis needs to be made by using at least five seismic signals according to the national building code. However, it was made using only one signal which is the seismic signal of the earthquake that occurred in Ica in August 2007.

Once the maximum forces are obtained from the analysis, these must be compared with the resistance of the structure to fulfill the code. The resistance of the structure must be greater than the forces obtained from seismic analysis.

The internal forces produced by seismic forces of the prototypes were analyzed by finite element method using the computer program ETABS as follows.

a) Analysis of structure

- The money balances the account. Drift of the structure (relative displacement of the structure due to the seismic forces)
- Internal forces (forces in all the walls due to seismic forces)

b) Check of structural conditions

Results obtained from ETAB are:

- Drift of the structure (maximum): 0.00035
- Internal forces of the wall (maximum values):

Table 3.1 Shear Force and Moment

Condition to check	Shear Force	Moment
By Spectral Analysis	3.12 Ton	6.75 Ton-m
By Time History Analysis	3.615 Ton	7.77 Ton-m

Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

c) Checking the wall capacity

The shear capacity of the wall (VR) was checked according to the E.070 code (National building code). We obtained a resistant shear of the most critical wall (affected by seismic force), calculated from the following data:

v´m= 5.1 kg/cm2 (handcrafted brick)

L = 315 cm (length of the wall)

t = 13 cm (thickness of the wall)

$$VR = 0.5 \cdot v'm \cdot L \cdot t$$

VR= 0.5 x (5.1) x (315) x (13)

VR=10,442 kg

In terms of the wall capacity of housing designed by prototype drawings, the figure calculated by computer needs to be less than the one demanded by National building code. Drift of the structure shall also be less than 0.005 according to National building code.

As a result, the housing designed prototype drawings were confirmed to be theoretically safe for the same conditions of the earthquake that occurred in August 2007.

Table 3.2 Results of Checking Drift of the Structure and Capacity of the Wall

Conditions of checking	Result obtained from ETABS	Value demanded by National building code	Result of the checking
Drift of the structure	0.00035	0.005	OK!
Capacity of the wall	3.616 Tons	10.442 Tons	OK!!

Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

3.1.3. Electrical, Water and Sewage Design

(1) Conditions of electrical design

The characteristics of electrical design are as follows.

- Legal bases of the design are municipality regulations, electrical concession regulations #25844 and its rules, national code of electricity use, and national regulation of construction.
- Board of voltage and one-wire diagram were decided according to four prototypes.
- Interior electrical installations such as lighting and outlets were decided according to four prototypes.

(2) Scope of electrical installation works

Electrical duct for power supply is installed from the point determined for the location of the energy measuring device by the concessionaire, to the general board located in the main bedroom of each prototype of the house. From this board the derivative circuits of lighting and outlet are controlled.

The installed voltage and peak load is determined according to the constructed net area.

The electrical supply for all the prototypes is 220 V - 1ø - 60 Hz.

(3) Conditions of water/sewage design

The characteristics of water and sewage design are as follows.

- Legal bases of the design are Title III of the National Regulations of Construction (RM 290-2005 Housing) and Technical Standard I.S.010.
- The gradients are according to the pipe diameter. The gradient in case of pipe with 4" diameter is 1%, and in case of pipe with 3" is 1.5%.

(4) Scope of water/sewage installation works

The distribution system covers from the installation of the measuring device to each consumption point. The supply and distribution systems have shutoff valves, elbows, T, reductions, etc. which will guarantee their quality, quantity and pressure of the service at the consumption point.

3.1.4. List of Drawings

An example of a complete set of prototype drawings for safer housing is listed below.

Table 3.3 Complete Set of Prototype Drawings for Safer Housing

(Example: Prototype 4 with Bathroom)

LIST OF DRAWINGS				
PROTOTIPO	**SPECIALITY**	**Nº OF DRAWING**	**DRAWING NAME**	**CONTENT OF THE DRAWING**
PROTOTYPE 4 (WITH BATHROOM)	ARCHITECTURE	A-01	FLOOR PLAN	Floor Plan Location of the prototype at the land Table of door and windows
		A-02	SECTIONS	Sections
		A-03	ELEVATIONS	Elevations
		D-01	CARPENTRY DETAILS	Details of doors
		D-02	CARPENTRY DETAILS	Sections of doors
		D-03	CARPENTRY DETAILS	Details of windows
		D-04	CARPENTRY DETAILS	Sections of windows
		D-05	CARPENTRY DETAILS	Sections of windows
	STRUCTURE	E-01	FOUNDATION AND STRUCTURE OF ROOFING	Foundation plan Lighter concrete slab plan
		E-02	TYPICAL DETAILS OF STRUCTURE OF ROOFING	Detail of lighter concrete slab Section of columns and beams
		E-03	TYPICAL DETAILS OF FOUNDATION	Foundation isometric
		E-04	TYPICAL DETAILS OF FOUNDATION	Sections of the foundation
		E-05	TYPICAL DETAILS OF FOUNDATION	Sections of the foundation
		E-06	TYPICAL DETAILS OF FOUNDATION	Elevation of the wall (geared) Isometric of distribution of steel in the joint column-wall
		E-07	TYPICAL DETAILS OF FOUNDATION	Elevation of the wall (steel bars) Isometric of distribution of steel in the joint column-wall
		E-08	TYPICAL DETAILS OF FOUNDATION	Detail of tie beam in doors zone Detail of reinforcement of tie beam in doors zone
		E-09	TYPICAL DETAILS	Details of joints of columns and beams Table of foundation conditions Table of general specifications Table of details of conections of steel bars Details of anchorage of beams Table of factors used in seismic analysis
	ELECTRICAL INSTALLATIONS	IE-01	ELECTRICAL INSTALLATIONS	Electrical installation plan Scheme of general board General electrical legend
	SANITARY INSTALLATIONS	IS-01	SANITARY INSTALLATIONS	Drainage system Water system
		IS-02	GENERAL DETAILS	Detail of ventilation Detail of lock gate valves Table of technical specifications General sanitary legend
PROTOTYPE 4 (WITH LETRINE)	SANITARY INSTALLATIONS	IS-03	SANITARY INSTALLATIONS OF LETRINE	Floor plan of letrine Section of letrine
		IS-04	SANITARY INSTALLATIONS OF LETRINE	Front elevation of letrine Table of technical specifications

Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

3.1.5. Cost Estimates

(1) Cost estimates

The prices of the construction materials and labor costs were determined according to the pricing performed at the localities of Chincha, Pisco and La Tinguiña during the months of August and September 2008. The unit costs were estimated as an average of the three districts. The bill of quantity (B/Q) was prepared based on the unit costs. In case of fluctuation of the prices, the B/Q can be revised by collecting the latest prices and recalculating the unit costs.

(2) Shopping list of prototype

A house owner, who selects the prototype drawings for safer housing, needs a shopping list of construction materials for the building which will be built based on the drawings. For the convenience of the house owner, shopping lists have been prepared by prototype (See Appendix 5). When the house owners go to construction material shops with the shipping list, they can purchase the appropriate quantity and quality of the required materials. In case of fluctuation of the prices, the shopping list can be updated by revised B/Q.

3.1.6. Selection Matrix of Prototype Drawings for Safer Housing

A selection matrix was prepared for house owners to select the prototype drawings fitting their type of housing reconstruction. The selection items of the matrix are: a) construction budget, b) soil type, c) roof type, d) availability of electricity, and e) availability of water/ sewage.

Construction budget, which varies by a combination of prices of Bono 6,000 and Techo Propio BFH, determines the number of rooms shown on four prototype drawings. Soil type, which shows firm or weak soil, determines the specifications of tie beam. Roof type determines light concrete slab or mud plaster on Guayaquil cane with crushed cane according to house owner's affordability. Availability of water/sewage determines a floor plan with inside bathroom or outside latrine.

The selection matrixes by prototype are shown below.

Table 3.4 Selection Matrix of Prototype Drawings for Safer Housing (Prototype1 Bonus 6000)

CONSTRUCTION AREA		KIND OF SOIL / FOUNDATION		KIND OF ROOF	ELECTRICAL INSTALLATIONS	KIND OF SANITARY INSTALLATIONS	CODIFICATION	COST S/.	COST S/. INCL. IGV
		CHARACTERISTICS	FOOTING						
PROTOTYPE 1 BONUS 6000	AREA 16.38 m2	REGULAR RESISTANCE GRANULAR MATERIAL WITH COBBLES OF SMALL TO BIG STONES s Acceptable soil 1.2 @ Mas kg/cm2	SIMPLE	VOIDED SLAB OF REINFORCED CONCRETE	AVAILABLE	WITH LATRINE	PROTOTYPE 1 # 01	6,844.82	8,145.34
						WITHOUT LATRINE	PROTOTYPE 1 # 02	5,900.64	7,021.77
					NOT AVAILABLE	WITH LATRINE	PROTOTYPE 1 # 03	6,408.71	7,626.37
						WITHOUT LATRINE	PROTOTYPE 1 # 04	5,464.53	6,502.79
				VOIDED ROOF WITH GUAYAQUIL CANE AND MUD CAKE	AVAILABLE	WITH LATRINE	PROTOTYPE 1 # 05	5,937.60	7,065.75
						WITHOUT LATRINE	PROTOTYPE 1 # 06	4,993.42	5,942.17
					NOT AVAILABLE	WITH LATRINE	PROTOTYPE 1 # 07	5,501.49	6,546.77
						WITHOUT LATRINE	PROTOTYPE 1 # 08	4,557.31	5,423.20
		LOW RESISTANCE SAND OR CLAY WITHOUT COBBLES s Acceptable soil 0.8 @ 1.2 kg/cm2	REINFORCED	VOIDED SLAB OF REINFORCED CONCRETE	AVAILABLE	WITH LATRINE	PROTOTYPE 1 # 09	7,102.45	8,451.92
						WITHOUT LATRINE	PROTOTYPE 1 # 10	6,158.27	7,328.34
					NOT AVAILABLE	WITH LATRINE	PROTOTYPE 1 # 11	6,666.34	7,932.95
						WITHOUT LATRINE	PROTOTYPE 1 # 12	5,722.16	6,809.37
				VOIDED ROOF WITH GUAYAQUIL CANE AND MUD CAKE	AVAILABLE	WITH LATRINE	PROTOTYPE 1 # 13	6,195.23	7,372.32
						WITHOUT LATRINE	PROTOTYPE 1 # 14	5,251.05	6,248.75
					NOT AVAILABLE	WITH LATRINE	PROTOTYPE 1 # 15	5,759.12	6,853.35
						WITHOUT LATRINE	PROTOTYPE 1 # 16	4,814.94	5,729.78

Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

Table 3.5 Selection Matrix of Prototype Drawings for Safer Housing (Prototype2 BFH 13400)

CONSTRUCTION AREA		KIND OF SOIL / FOUNDATION		KIND OF ROOF	ELECTRICAL INSTALLATIONS	KIND OF SANITARY INSTALLATIONS	CODIFICATION	COST S/.	COST S/. INCL. IGV
		CHARACTERISTICS	FOOTING						
PROTOTYPE 2 BFH 13400	AREA 35.47 m2	REGULAR RESISTANCE GRANULAR MATERIAL WITH COBBLES OF SMALL TO BIG STONES σ Acceptable soil 1.2 @ Mas kg/cm2	SIMPLE	VOIDED SLAB OF REINFORCED CONCRETE	AVAILABLE	BATHROOM	PROTOTYPE 2 # 01	13,727.94	16,336.25
						LATRINE	PROTOTYPE 2 # 02	12,958.89	15,421.08
					NOT AVAILABLE	BATHROOM	PROTOTYPE 2 # 03	13,058.15	15,539.20
						LATRINE	PROTOTYPE 2 # 04	12,330.30	14,673.06
				VOIDED ROOF WITH GUAYAQUIL CANE AND MUD CAKE	AVAILABLE	BATHROOM	PROTOTYPE 2 # 05	11,876.87	14,133.47
						LATRINE	PROTOTYPE 2 # 06	11,084.98	13,191.13
					NOT AVAILABLE	BATHROOM	PROTOTYPE 2 # 07	11,207.07	13,336.41
						LATRINE	PROTOTYPE 2 # 08	10,456.39	12,443.11
		LOW RESISTANCE SAND OR CLAY WITHOUT COBBLES σ Acceptable soil 0.8 @ 1.2 kg/cm2	REINFORCED	VOIDED SLAB OF REINFORCED CONCRETE	AVAILABLE	BATHROOM	PROTOTYPE 2 # 09	14,238.98	16,944.39
						LATRINE	PROTOTYPE 2 # 10	13,436.78	15,989.77
					NOT AVAILABLE	BATHROOM	PROTOTYPE 2 # 11	13,569.19	16,147.33
						LATRINE	PROTOTYPE 2 # 12	12,808.19	15,241.75
				VOIDED ROOF WITH GUAYAQUIL CANE AND MUD CAKE	AVAILABLE	BATHROOM	PROTOTYPE 2 # 13	12,387.90	14,741.60
						LATRINE	PROTOTYPE 2 # 14	11,562.87	13,759.81
					NOT AVAILABLE	BATHROOM	PROTOTYPE 2 # 15	11,718.11	13,944.55
						LATRINE	PROTOTYPE 2 # 16	10,934.28	13,011.79

Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

Table 3.6 Selection Matrix of Prototype Drawings for Safer Housing

(Prototype3 Bonus BFH 16400)

CONSTRUCTION AREA		KIND OF SOIL / FOUNDATION		KIND OF ROOF	ELECTRICAL INSTALLATIONS	KIND OF SANITARY INSTALLATIONS	CODIFICATION	COST S/.	COST S/. INCL. IGV
		CHARACTERISTICS	FOOTING						
PROTOTYPE 3 BONUS BFH 16400	AREA 43.23 m2	REGUAR RESISTANCE GRANULAR MATERIAL WITH COBBLES OF SMALL TO BIG STONES σ acceptable soil 1.2 @ Mas kg/cm2	SIMPLE	VOIDED SLAB OF REINFORCED CONCRETE	AVAILABLE	BATHROOM	PROTOTYPE 3 # 01	17,371.36	20,671.91
						LATRINE	PROTOTYPE 3 # 02	16,454.80	19,581.21
					NOT AVAILABLE	BATHROOM	PROTOTYPE 3 # 03	16,611.29	19,767.43
						LATRINE	PROTOTYPE 3 # 04	15,730.17	18,718.90
				VOIDED ROOF WITH GUAYAQUIL CANE AND MUD CAKE	AVAILABLE	BATHROOM	PROTOTYPE 3 # 05	14,591.30	17,363.64
						LATRINE	PROTOTYPE 3 # 06	13,796.21	16,417.49
					NOT AVAILABLE	BATHROOM	PROTOTYPE 3 # 07	13,831.23	16,459.16
						LATRINE	PROTOTYPE 3 # 08	13,071.58	15,555.18
		LOW RESISTANCE SAND OR CLAY WITHOUT COBBLES σ acceptable soil 0.8 @ 1.2 kg/cm2	REINFORCED	VOIDED SLAB OF REINFORCED CONCRETE	AVAILABLE	BATHROOM	PROTOTYPE 3 # 09	18,014.27	21,436.99
						LATRINE	PROTOTYPE 3 # 10	17,042.89	20,281.04
					NOT AVAILABLE	BATHROOM	PROTOTYPE 3 # 11	17,254.20	20,532.50
						LATRINE	PROTOTYPE 3 # 12	16,318.26	19,418.74
				VOIDED ROOF WITH GUAYAQUIL CANE AND MUD CAKE	AVAILABLE	BATHROOM	PROTOTYPE 3 # 13	15,234.22	18,128.72
						LATRINE	PROTOTYPE 3 # 14	14,384.31	17,117.32
					NOT AVAILABLE	BATHROOM	PROTOTYPE 3 # 15	14,474.15	17,224.23
						LATRINE	PROTOTYPE 3 # 16	13,659.68	16,255.02

Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

Table 3.7 Selection Matrix of Prototype Drawings for Safer Housing

(Prototype4 Bonus 6000+13400)

CONSTRUCTION AREA		KIND OF SOIL / FOUNDATION		KIND OF ROOF	ELECTRICAL INSTALLATIONS	KIND OF SANITARY INSTALLATIONS	CODIFICATION	COST S/.	COST S/. INCL. IGV
		CHARACTERISTICS	FOOTING						
PROTOTYPE 4 BONUS 6000 + 13400	AREA 53.13 m2	REGUAR RESISTANCE GRANULAR MATERIAL WITH COBBLES OF SMALL TO BIG STONES σ Acceptable soil 1.2 @ Mas kg/cm2	SIMPLE	VOIDED SLAB OF REINFORCED CONCRETE	AVAILABLE	BATHROOM	PROTOTYPE 4 # 01	19,300.73	22,967.87
						LATRINE	PROTOTYPE 4 # 02	18,391.78	21,886.22
					NOT AVAILABLE	BATHROOM	PROTOTYPE 4 # 03	18,387.87	21,881.56
						LATRINE	PROTOTYPE 4 # 04	17,520.13	20,848.95
				VOIDED ROOF WITH GUAYAQUIL CANE AND MUD CAKE	AVAILABLE	BATHROOM	PROTOTYPE 4 # 05	16,670.86	19,838.33
						LATRINE	PROTOTYPE 4 # 06	15,799.02	18,800.83
					NOT AVAILABLE	BATHROOM	PROTOTYPE 4 # 07	15,758.00	18,752.02
						LATRINE	PROTOTYPE 4 # 08	14,927.36	17,763.56
		LOW RESISTANCE SAND OR CLAY WITHOUT COBBLES σ Acceptable soil 0.8 @ 1.2 kg/cm2	REINFORCED	VOIDED SLAB OF REINFORCED CONCRETE	AVAILABLE	BATHROOM	PROTOTYPE 4 # 09	20,042.38	23,850.43
						LATRINE	PROTOTYPE 4 # 10	19,078.61	22,703.55
					NOT AVAILABLE	BATHROOM	PROTOTYPE 4 # 11	19,129.52	22,764.12
						LATRINE	PROTOTYPE 4 # 12	18,206.95	21,666.27
				VOIDED ROOF WITH GUAYAQUIL CANE AND MUD CAKE	AVAILABLE	BATHROOM	PROTOTYPE 4 # 13	17,412.51	20,720.89
						LATRINE	PROTOTYPE 4 # 14	16,485.84	19,618.15
					NOT AVAILABLE	BATHROOM	PROTOTYPE 4 # 15	16,499.65	19,634.58
						LATRINE	PROTOTYPE 4 # 16	15,614.19	18,580.88

Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

3.2. Dissemination Materials of Prototype Drawings for Safer Housing

3.2.1. List of the Dissemination Materials of Prototype Drawings

The dissemination materials of prototype drawings for safer housing are listed below.

Table 3.8 List of Dissemination Materials for Prototype Drawings

Outputs	Distributing to						
	JICA Study Team member	JICA - headquater	JICA -Peru office	MVCS	Pueblo Nuevo, Independencia and La Tinguina	Ica regional government	Total
Manual of Improved Building Permit for Safer Housing	3	1	1	6	6 x 3 = 18	1	30
Manual of Simple Inspection for Construction of Safer Housing	4	1	1	44	10 x 3 = 30	10	90
Manual of Watching over Construction of Safer Housing	4	1	1	35	183 x 3 = 549	10	600
Poster of Minimum Requirements for Safer Housing	4 + 4 = 8	1	1	34	15 x 3 = 45	1	90
Poster of Prototype Drawings for Safer Housing	4 + 4= 8	1	1	34	15 x 3 = 45	1	90
Pamphlet of Prototype Drawings for Safer Housing in the Process of Building Permit	4 + 200 = 204	1	1	105	393 x 3 = 1179	10	1500

Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

3.2.2. Manual of Improved Building Permit for Safer Housing (See Appendix 6)

This manual consists of three chapters as follows.

Chapter I provide the readers with necessary knowledge of the improved building permit administration and required structure of the administration. The necessary knowledge covers legal, technical and administrative aspects. Important laws and regulations concerning building permit were selected and listed in order to understand building permit system. Key factors of safer housing with confined masonry are illustrated based on the minimum requirements. Prototype drawings are introduced as typical drawings classified under conditions of affordable construction cost, soil characteristics, future expansion, and availabilities of electricity and sanitation. With respect to the manual of monitoring construction of safer housing and the manual of simple inspection for construction of safer housing, it is shown how to use those manuals in the process of obtaining building permit and construction. Majority of house owners use self-construction method to save their construction budgets. Required conditions of self-construction are explained to avoid misunderstandings about a definition of self-construction among local people.

Chapter II shows a comprehensive flowchart of the improved building permit system and points out important matters in each stage of the flowchart.

Chapter III shows the practical procedures in nine (9) steps. Each step accounts for a practical administration procedure within the process of building permit and construction.

Step 1 - To disseminate the improved building permit system. The items mentioned in this step include what to disseminate and how.

Step 2 - How to give advice on selection of the prototype drawings to building permit applicants. Accordingly, a person in charge of building permit section of district municipality shall have detailed knowledge of the prototype drawings and explain the drawings characteristics to the building permit applicants.

Step 3 - How to prepare the documents for the building permit application.

Step 4 - Shows the administrative procedures when receiving the application.

Step 5 - Explains evaluation criteria to issue building permit.

Step 6 - To issue the building permit and at the same time to provide the applicants with the selected prototype drawings and the manual of monitoring construction of safer housing. It is recommended to make a presentation on how to use manual provided for every ten (10) applicants who receive authorization.

Step 7 - Explains the manual of monitoring construction of safer housing.

Step 8 - Explains the manual of simple inspection for construction of safer housing. At seventh and eighth steps, the most important topic is how to make use of checklists shown in the two manuals.

Step 9 - Explains making a project-bank and how to use statistical data of completed houses with building permits.

3.2.3. Manual of Monitoring the Construction for Safer Housing (See Appendix 7)

This manual can be used by house owners to check whether or not house construction is performed appropriately. The manual is user-friendly and prepared for a person who has no construction knowledge to understand appropriate construction methods easily. Illustration with a comic strip shows the minimum requirements for safer housing at each stage of construction. The comic strip illustrates questions and answers between house owners and masons during a house construction. The construction stages are cover preliminary works, excavation works, foundation works, masonry works, reinforced concrete column works, reinforced concrete ring beam works, roofing works and finishing works.

3.2.4. Manual of Simple Inspection for Construction of Safer Housing (See Appendix 8)

This manual was written for government officials of district municipalities.

Chapter I provide the readers with necessary knowledge of simple inspection. The necessary knowledge consists of technical and administrative aspects. Fifty (50) selected technical terms are introduced to allow a smooth communication between inspectors and construction laborers. The heart of the book is an illustration of what is a simple inspection is. It discloses

what level of technical capability is needed as municipal inspector, taking into consideration actual availability of personnel in district municipalities.

Chapter II gives a practical procedure for the simple inspection. The preparation stage of inspection covers tasks such as training, collection of documents and scheduling of implementation. In the inspection stage, the important points are described in four inspection visits from the beginning of construction to the completion of construction. In each inspection the timing, targets to be inspected, evaluation and suggestions, and recording are explained.

3.2.5. Poster of Minimum Requirements for Safer Housing (See Appendix 9)

This poster shows minimum requirements for safer housing with several illustrations. Important aspects of the minimum requirements are as follows.

(1) Quality of Materials

- Concrete
- Mortar
- Foundation
- Wood
- Brick
- Water

(2) Structural Section of Main Members

- Foundation
- Sections of reinforced concrete member
- Maximum span

(3) Connection of Structural Members

- Anchor of column to tie beam and ring beam
- Connection of wall and column
- Overlapping of reinforcements
- Wall joint mortar thickness

3.2.6. Poster of Prototype Drawings for Safer Housing (See Appendix 10)

This poster shows prototype drawings for safer housing with some examples of a floor plan, an elevation, and a selection matrix by prototype. It is used as dissemination material of prototype drawings for house owners who will reconstruct their houses.

3.2.7. Leaflet of Prototype Drawings for Safer Housing in the process of building permit (See Appendix 11)

This Leaflet is used to show a building permit procedure, provided that the prototype drawings for safer housing are registered into project bank of the district municipality. The procedure consists of nine steps as follows:

Step 1 - Disseminating of improved building permit system

Step 2 - Selecting the prototype drawings for safer housing

Step 3 - Preparing the building permit application

Step 4 - Receiving the building permit application

Step 5 - Evaluating the building permit documents

Step 6 - Issuing the building permit

Step 7 - Monitoring house construction by the house owner

Step 8 - Inspecting house construction by municipality officer

Step 9 - Making project bank of completed houses

The leaflet shows images of actions or results at each step with comic strips.

3.3. Results of OJT for Technical Officers of Public Work Section in District Municipality

3.3.1. Subjects and Methods of OJT

OJT was held to facilitate technical officers of municipality to carry out building permit administration smoothly provided that the prototype drawings will be registered into the project bank. Five subjects for the OJT program were used to demonstrate the building permit system practically as follows: the prototype drawings for safer housing, the minimum requirements for safer housing, the manual of improved building permit, the manual of monitoring construction of safer housing, and the manual of simple inspection for construction of safer housing. An engineer as trainer was dispatched to each municipality from the JICA Study Team.

Training methods were a lecture, role playing, and observation at a construction site. JICA Study Team dispatched a local civil engineer as a trainer to each of the three municipalities.

3.3.2. Schedule

The actual OJT schedules are shown by district in the following table.

Table 3.9Actual OJT Schedules

Distrito	TURNO	06/10	07/10	08/10	09/10	10/10	11/10	12/10	13/10	14/10	15/10	16/10	17/10	18/10	19/10	20/10	21/10	22/10	23/10	24/10	25/10	26/10	27/10	28/10	29/10	30/10	31/10	01/11	02/11	03/11	04/11	05/11	06/11	07/11	08/11	09/11	10/11	11/11	12/11	13/11	14/11
PUEBLO NUEVO	MAÑANA																																								
	TARDE																																								
INDEPENDENCIA	MAÑANA																																								
	TARDE																																								
LA TINGUIÑA	MAÑANA																																								
	TARDE																																								

Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

3.3.3. Results of the OJT

All the technical staff of the public work section of the district municipality participated in OJT as trainees.

The trainees understanding of the five subjects of the OJT was evaluated by the JICA Study Team. Test sheets were prepared and used for the evaluation (See Appendix 12). An example of the test results is shown below. Tests were conducted twice on everyone. It was found that some people were below the passing mark in the first test; however, in the second test, everyone passed. Accordingly, it is concluded that the OJT achieved its objectives. The test results are shown in the Appendix 13.

Table 3.10 OJT Test Results in La Tinguiña

Officers of District Municipality	Training hours(hrs.)					First test (point)						Second test (point)					
	Prototype drawings	Minimum requirements	Manual of improved building permit	Manual of simple inspection	Manual of watching over	Prototype drawings	Minimum requirements	Manual of improved building permit	Manual of simple inspection	Manual of watching over	Total score	Prototype drawings	Minimum requirements	Manual of improved building permit	Manual of simple inspection	Manual of watching over	Total score
TEOFILO FLORES TORRES	10	10	8	6	10	15	20	20	12	8	75	14	17	14	16	12	73
SANDRA ORE HURTADO	12	10	10	8	12	11	20	15	20	16	82	20	20	17	16	14	87
JUSTO CARGUAS HUAMAN	8	8	8	6	10	16	17	15	8	16	72	14	17	14	20	14	79

Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

Remark: Full score of subject of the OJT is 20 point and 50 % is a passing mark of the test.

The prototype drawings for safer housing were designed to be easily registered in the project bank of the municipality by the OJT activity of the JICA Study Team. The following are results of registration of project bank in each municipality. As of December 2007, Pueblo Nuevo, Independencia and La Tinguiña registered the prototype drawings into the project bank. The legal procedures of the municipality resolutions were in force (See Appendix 15). Therefore, the OJT in the three districts were got excellent results. However, processing step

3 as shown in Table 3.11 took time due to postponement of municipality deliberation on the project bank.

Table 3.11 Progress of Registration of Prototype Drawings in Project Bank

	Step 1	Step 2	Step 3		Step 4
District	Checking of prototype drawings by Technical Office of the municipality and preparation of Technical Report aapproving these prototype drawings	Submit the Technical Report to municipality mayor's office	In Congress of municipality, the creation of Bank of Projects and the insertion of Prototype Drawings for Safer Housing is approved	In use of his attributes the Mayor of the Municipality decided to approve the creation of Bank of Projects and the insertion of Prototype Drawings for Safer Housing	The municipal resolution is issued of the creation of Bank of Projects of the municipality
PUEBLO NUEVO					The Bank of Projects of municipality is implemented and the prototype drawings are approved with Mayor Resolution No. 4377-A-MDPN/2008 on November 19th, 2008
INDEPENDENCIA					The Bank of Projects of municipality is implemented and the prototype drawings are approved with Municipal Resolution No. 085-2008-ALC-MDI/P on October 24th, 2008
LA TINGUIÑA					The Bank of Projects of municipality is implemented and the prototype drawings are approved with Municipal Resolution No. 032-2008-MDL T on December 11th, 2008

Source: Information from the abovementioned three municipalities collected by JICA Study Team, 2008

3.4. Results of Workshop for Ordinary People in District Municipality

3.4.1. Programs and Methods of Workshop

A workshop was held to disseminate the prototype drawings and building permit in each of the three municipalities. The local engineers dispatched from the JICA Study Team were facilitators in the workshops.

3.4.2. Schedule

The actual workshop schedules are shown by district in the following table.

Table 3.12 Schedule of Workshops held in the Three Districts

District		09/10	10/10	16/10	17/10	23/10	24/10	30/10	31/10	07/11	25/11	26/11
PUEBLO NUEVO	MORNING											
	AFTERNOON	■		■		■		■				■
LA TINGUIÑA	MORNING											
	AFTERNOON		■		■		■		■		■	
INDEPENDENCIA	MORNING											
	AFTERNOON				■		■			■		■

Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team

3.4.3. Results of the Workshop

The number of participants was as follows: 173 persons in Pueblo Nuevo, 143 in Independencia and 109 in La Tinguina (See Table 3.10). After holding the workshops, a form for checking how many workshop participants made use of prototype drawings was prepared and delivered to public work section in each district municipality. However, participants of the workshops did not yet visit the municipalities for consulting on building permit due to insufficient efforts of municipality for dissemination.

Table 3.13 No. of Participants of the Workshops

District	Number of workshop	Date	No. of Participants	Total No. of Participants
PUEBLO NUEVO	No. 1	9-Oct	54	173
	No. 2	16-Oct	25	
	No. 3	23-Oct	20	
	No. 4	30-Oct	74	
	No. 5	26-Nov	0	
INDEPENDENCIA	No. 1	17-Oct	12	143
	No. 2	24-Oct	34	
	No. 3	7-Nov	71	
	No. 4	26-Nov	26	
LA TINGUIÑA	No. 1	10-Oct	17	109
	No. 2	17-Oct	25	
	No. 3	24-Oct	5	
	No. 4	31-Oct	60	
	No. 5	25-Nov	2	

Source: Study on Housing Reconstruction with Seismic-resistance Houses in the Republic of Peru, JICA Study Team