Quick Report No.2 (Revised version) Response of the People in Banda Aceh just after the 2012 April 11 Off-Sumatra Earthquake (Mw8.6)

By

Yozo Goto,	Visiting researcher, the University of Tokyo,	e-mail: gotoyozo@mti.biglobe.ne.jp
Muzailin Affan,	Lecturer, Syiah Kuala University,	e-mail: muzailin2000@yahoo.com
Nur Fadli,	Lecturer, Syiah Kuala University,	e-mail: ivad29@yahoo.com

Contents

Introduction	- 1
1. Summary of Result	- 1
2. Survey Area and Data Reliability	- 3
2.1 Survey area and population	- 3
2.2 Age and gender of responders (answerers to our questionnaire)	- 4
2.3 Dividing the survey area into zone corresponding to the distance from the coast	- 5
2.4 Zone dependency of the feature of responder	- 5
2.5 Responder's location at the time of earthquake	- 7
2.6 Estimation of location of the people in Banda Aceh at the time of the earthquake	- 9
3. Data about Evacuation	-10
3.1. Evacuation features according to the zone and gender	-10
3.2 Evacuation method	-11
3.3 Time of starting evacuation	-12
3.4 Total time needed for evacuation	-13
3.5 Effect of returning to home and/or going to school	-15
3.6 Changing of route or destination for evacuation	-17
3.7 Reasons not to evacuate	-18
4. Data about Information Propagation	-19
4.1 Tsunami alert	-19
4.2 Trigger of starting evacuation	-20
4.3 Information from TV	-26
5. Evacuation route Drawing	-29
5.1 Drawing method	-29
5.2 All data	-30
5.3 Estimation on traffic jam area	-32
6. Task from Now and Next Report	-33

Introduction

The Mw 8.6 earthquake which occurred at 15:38 PM on April 11, 2012 at offing of west of north Sumatra frightened the people and triggered an evacuation rush and heavy traffic confusion in Banda Aceh. The aftershock of Mw 8.2 followed it about two hours later, and confused the people again. Fortunately, these earthquakes did not raise effective tsunami and structural damage because the focal mechanisms were strike-slip and the epicenters were more than five hundred kilometer away from the coast of Sumatra.

These earthquakes were really lucky ones. However, the next one may not be lucky one. Therefore, we must learn the lessons from the incident of April 11, and utilize them to improve the disaster management system of Banda Aceh, raise the preparedness of the people and community, and improve the infrastructure of the city so as to be more tough and functionable.

From this point of view, the authors (hereafter; we) executed a questionnaire survey through interview (structured interview) in order to know the people's immediate responses and actions to the earthquake. We dispatched eleven students and graduate students of Syiah Kuala University to the tsunami-prone villages of Banda Aceh and collected the answers from 813 residents.

The simple statistical analyses of the data were already reported as a quick report on May 9. And this is the second quick report which includes some additional data, statistical analyses and discussions. We are analyzing the data by comparing with the results of the evacuation simulation. Then the final report will be issued including the comparative analysis with the simulation, discussions and recommendations.

Our survey was supported by JICA Jakarta project office.

1. Summary of Result

- (1) We divided the survey area into five zones from the coast to the inland and named them as A-E (Figure 5). A is mainly fisherman's zone, C is shop and business zone, D is office and residents zone and E is university zone (Table 3). The age distribution of our responders well fit to that of the all people in Banda Aceh (Figure 2 and 3).
- (2) At the time of the earthquake, 80% of the responders in A, B and C, and 72% of them in D and E were at home or near their home (Table 5 and 7).
- (3) 65% of the responders in A and B, 55% in C and 48% in E evacuated inland. 25% in A and 10-18% in other area evacuated to mosques and high buildings (Table 9).
- (4) 82.5% of the responders in B and 80% of E did evacuation using motor bike. And, 72% of A and D and 60% of C used motor bike. The remaining part of the people evacuated on foot or by car. Around 60% of them were on foot and 40% were by car, although these percentages varied according to the feature of each zone. 2-3% of the responders in A and B evacuated by bicycle (Table 11).
- (5) The time of starting evacuation was around 5-10 minutes after the earthquake in A, B and C. It was a little longer in D. The data from E was not reliable because of the small sample (Figure 7).

- (6) The difference of the start times between the motor bike and the car users was not observed, but the walkers started a little later (Figure 8).
- (7) Most of the responders who did evacuation by walking completed their evacuation within 20 minutes. They were estimated to have gone to the mosques and the high buildings nearby. The motor bike and car users needed more than 40 minutes (Figure 11).
- (8) 93% of the car users and 85% of the motor bike users were trapped in traffic jam during their evacuation. They spent 15 minutes in average by the traffic jam (Table 12).
- (9) The people who were staying out were a little late to start. Many of the people who returned home and went to school were late to start 10-20 minutes (Figure 17).
- (10) 45% of the responder who went to school from their home to pick up their children needed more than one hour for completing their evacuation. 65% of them needed 40-60 minutes (Figure 18).
- (11) While, 45% of the people who returned to home and went to school completed their evacuation within 20 minutes. They must have seen the heavy traffic jam on the way to their home, give up going inland, and go to a mosque or a building nearby. (Figure 19).
- (12) The sirens in Banda Aceh seemed to be switched on 30-40 minutes after the earthquake. But, they were still effective because around 20% of the people were noticed the tsunami alert by the sirens (Table 18 and 20).
- (13) 9% of the people got information of the tsunami alert from TV. However, the majority of the people, 60% of them were relying on personal news sources, such as shout of neighbors, SMS from family or friend etc. This situation is dangerous because people can easily get upset by rumor and fall into panic (Table 20).
- (14) Around 50% of the people in A and B thought that the tsunami, like the 2004, would come, however, only 25% in C and D did so. The males in the zone C and D, especially, were more optimistic than others (Table 21).
- (15) The first reason (50-30%) of starting evacuation was that they felt the strong earthquake. The second (50-20%) was by seeing others' evacuation. It should be marked that there were not any attention to let people evacuate from public staffs of the city (Table 22).
- (16) The experience of the 2004 giant tsunami had let the people start quick evacuation in some extent. 70% of the people never participated disaster drill. They had a tendency not evacuating (Figure 21 and 22).
- (17) The people having high educational background (Bachelor, etc.) and the people having low educational background (Elementary High School) had tendency not evacuating. The latter's reason might come from age. The most of the low educational background people were elder than 40s (Table 29).
- (18) Some areas in Banda Aceh, mainly the downtown area, seemed not to have lost the electric power. Most of the responders who could watch TV got the alert of tsunami from it (Figure 24).
- (19) The evacuation route drawings based on the responders witness are effective. It was clearly seen that the persons who needed more than one hour in order to finish their evacuation intended to go inland from the coast side. They needed to cross the main road which extended from south west to north east in the center of Banda Aceh, whereas the persons who completed within 20 minutes went to mosque or high building and did not cross the main road (Figure 29-31).

2. Survey Area and Data Reliability

2.1 Survey area and population

The survey area was the north-west side of the blue line on the map shown in Figure 1. Because our survey focused on the response of the people who were in the tsunami-prone area and because the resource for the survey was limited, the area did not cover the whole area of Banda Aceh and concentrated to its sea side.



Figure 1. Our survey area

Our survey area covers four districts, namely Meuraxa, Kuta Raja, Kuta Alam and Syiah Kuala.

Table 1 is the population and number of responders who were interviewed in each district. Around 0.7-0.9 % of the population in these districts were interviewed.

Name of District	Population a	nd density 2010*	Number of	Responders/		
Name of District	Population	Density (/km2)	responders	Population		
Meuraxa	16,484	2,271	157	0.95%		
Kuta Raja	10,433	2,003	94	0.90%		
Kuta Alam	42,217	4,201	314	0.74%		
Syiah Kuala	34,85	2,447	248	0.71%		
Sum.	103.984		813	0.78%		
All Banda Aceh	223.446	3,642				

Table 1. Population and number of responder of our survey area

* Compiled from the data in BANDA ACEH DALAM ANGKA 2011 (Data book of Banda Aceh, published by the Central Bureau of Statistics, City of Banda Aceh)

2.2 Age and gender of responders (answerers to our questionnaire)

Figure 2 shows the distribution of age and gender. Although the number of male in our sample is larger, there seems no meaningful difference between age distribution of female and male.



Figure 3 is the age distribution compiled from the 2010 data of the official data book of the City of Banda Aceh, which assures that our responder's age distribution well fits to that of the whole city except the middle age is a little thick. However, when comparing the distribution with that of whole Indonesia (Figure 4), it is clear that our data slants to younger generation, especially into 20's. When applying the data to whole Indonesia, we should be careful in this deviation of age distribution.



Figure 4. Age distribution of whole Indonesia

2.3 Dividing the survey area into zone corresponding to the distance from the coast

We divided the survey area into 5 zones from coast line to inland as shown in Figure 5.



Figure 5. Zoning of the survey area

2.4 Zone dependency of the feature of responders

(1) Responder's job and gender

The percentage of working and non-working population of all Banda Aceh is shown in Table 2.

Then, we checked the responder's job in each zone. The result is shown on Table 3 by the percentage among the number of responders and their gender.

Job status	Population	Percentage
Working	80,335	35.8%
Unemployment	10,505	4.7%
Taking care of household	28,956	12.9%
Others	7,873	3.5%
Student (greater than 14)	41,643	18.5%
Children (less than 15)	55,215	24.6%

Table 2. Working and non-working percentage of Banda Aceh

* Compiled from the data in BANDA ACEH DALAM ANGKA 2011 (Data book of Banda Aceh, published by the Central Bureau of Statistics, City of Banda Aceh)

		Fei	male (%	6)			N	/Iale (%)	
	А	В	С	D	E	А	В	С	D	Е
1. Fisherman (without having a ship)	0.0	1.5	0.0	1.6	0.0	16.7	17.5	14.3	1.5	0.0
2. Fisherman (having a ship)	0.0	0.7	0.0	0.0	0.0	16.7	4.5	2.4	0.0	0.0
3. Farmer	0.0	0.7	0.0	0.0	0.0	0.0	0.5	0.0	1.5	0.0
4. Factory manager or owner	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5. Shop manager or owner	7.1	1.5	6.9	0.0	7.1	5.6	6.5	16.7	6.0	18.2
6. Manager of service business or owner	0.0	0.7	1.1	1.6	0.0	0.0	0.5	1.6	1.5	0.0
7. Contractor of a construction business	2.4	0.0	1.1	0.0	0.0	1.9	1.0	0.8	3.0	0.0
8. Salaried worker (including a part time worker) at public sector	7.1	7.3	11.5	16.1	21.4	5.6	14.0	13.5	22.4	18.2
9. Salaried worker (including a part time worker) at private sector	9.5	8.8	6.9	19.4	7.1	9.3	11.5	15.1	23.9	13.6
10. Stay-at-home wife	47.6	52.6	44.8	24.2	0.0	0.0	1.0	0.8	0.0	4.5
11. Student	23.8	24.1	25.3	27.4	64.3	18.5	22.0	19.0	28.4	31.8
12. No job	0.0	0.0	1.1	8.1	0.0	9.3	4.0	6.3	4.5	9.1
13. Other	2.4	2.2	1.1	1.6	0.0	16.7	17.0	9.5	7.5	4.5
Number of sample	42	137	87	62	14	54	200	126	67	22

Table 3. Responder's job in each area

- There are rather many fishermen in the zones A, B and C (color yellow), and especially in zone A nearing sea side, owner of fishing boat is prominent.
- Shop manager or owner is prominent in the zone C (color blue). It is because this area includes the shopping district along the main road of the city.
- In the zone D and E (color orange), salaried workers are prominent. These areas may have a modernized feature as a bed town where people commute from their home to their working places. Considerable number of the women in the zone D has job.
- Students spread to all areas, but is prominent in the zone E (color green) where the university area is. Woman student in the zone E is prominent exceptionally. This may be because our interviewers were all male students.

(2) Responders' age and gender

As already shown in Figure 3, the responder's age distribution slants to 20s when compared to all Indonesia. Table 4 lists the age distribution in each zone to know this deviation more precisely.

A = =		F	Female (%	6)		Male (%)					
Age	А	В	C	D	Е	А	В	C	D	Е	
10	4.8	2.9	9.2	8.1	0.0	9.3	3.0	5.6	3.0	4.5	
20	45.2	39.4	27.6	50.0	71.4	27.8	39.0	34.9	61.2	59.1	
30	28.6	20.4	32.2	25.8	7.1	40.7	28.5	22.2	17.9	22.7	
40	21.4	25.5	20.7	6.5	7.1	16.7	19.0	23.0	7.5	4.5	
50	0.0	8.8	9.2	6.5	7.1	5.6	9.0	9.5	7.5	9.1	
60	0.0	2.9	1.1	0.0	0.0	0.0	1.5	2.4	3.0	0.0	
70	0.0	0.0	0.0	3.2	7.1	0.0	0.0	1.6	0.0	0.0	
80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	
Number of sample	42	137	87	62	14	54	200	126	67	22	

Table 4. Responder's age in each area

• The distributions in zone A, B and C look normal, however excessive concentrations to 20s are seen in the zone D and E. Without a detail age distribution data, we cannot discuss whether these concentrations may come from the feature of the zone or may come from the interviewers' preferences. When we use the data from the zone D and E to analyze age-sensitive response, we should be careful to this deviation.

2.5 Responder's location at the time of earthquake

The earthquake occurred in day time (15:38 PM) and our interview was implemented in day time too. Therefore, one of the problems of our questionnaire is the question about the responder's location at the time of the earthquake. If a responder is in his home and we ask to him "where were you at the time of earthquake?", the answer would slant to "home". If we ask to the responder who is in his/her home "where were you located at the time of earthquake?" the answer would slant to "home". And if we ask to the responder who is in the business area, the answer would slant to "working place".

(1) Responder's job and his/her location at the time of the earthquake

The relation between the responder's job and his/her location at the time of the earthquake is shown in Table 5, which may become an approach to discuss this problem,

	1. Home	3. Outdoor working place	2. Working place inside a building	4. School	6. Inside other buildings	Sample
1. Fisherman (employed)	47.0%	28.8%	0.0%	0.0%	21.2%	66
2. Fisherman (having a ship)	54.5%	27.3%	9.1%	0.0%	9.1%	22
5. Shop manager or owner	57.9%	0.0%	38.6%	0.0%	1.8%	57
8. Salaried worker at public	35.0%	1.9%	49.5%	1.0%	1.9%	103
9. Salaried worker at private	31.7%	5.0%	54.5%	0.0%	2.0%	101
10. Stay-at-home wife	94.0%	0.0%	0.7%	0.0%	0.7%	150
11. Student	50.3%	0.5%	6.6%	15.2%	5.6%	197
12. No job	62.5%	6.3%	0.0%	0.0%	12.5%	32
13. Other	43.3%	10.4%	22.4%	0.0%	4.5%	67

Table 5. Relation between the responder's job and his/her location at the time of the earthquake

• It is quite natural that most of the "Stay-at-home wives" were at "Home" (color yellow).

- About 50 to 60 percent of the "Salaried workers" were at "Working place" (color orange). The actual percentage of being at "Working place" must be larger.
- \cdot Only 15 percent of the "Students" were at school. We should make clear the school time.

(2) Ratio of salaried worker in his/her working place at the time of the earthquake

In order to advance this discussion, the percentage of the "Salaried worker" who was in his/her "working place" was calculated and shown in Table 6.

	А	В	С	D	Е
Salaried worker at public sector who was in his/her working place	50.0%	52.6%	48.1%	52.0%	57.1%
Sample	6	38	27	25	7
Salaried worker at private sector who was in his/her working place	77.8%	60.0%	44.0%	71.4%	25.0%
Sample	9	35	25	28	4

Table 6. Ratio of salaried worker who was in his/her working place

• The data of zone A and E are not reliable because of the small amount of sample.

• When looking at zone B, C and D, we cannot identify distinct remarkable features.

- In the zone D, the ratio of the worker at private sector who was in his/her working place is higher than others, but the reason is not clear.
- · However, it is confirmed that the ratio of workers who were at their working place can exceed 70%.

(3) Age, gender and location

Table 7 is a matrix of the location and age of responders. The zone B is selected as a typical area. The females in the working place decrease between the 20s and 30s rapidly (color yellow). This may show the difficulty in continuing to work to married women.

Zoon	1	Zo	ne-B	Fema	ale		Zone-B Male					
Location	10	20	30	40	50	60	10	20	30	40	50	60
1. Your home (including shop or office which is combined with your home)	4	30	24	34	9	3	3	35	22	17	11	1
2. Working place inside a building (office, factory, shop etc.)	0	13	2	0	2	0	1	15	22	6	3	1
3. Outdoor working place (harbor, outdoor factory, field, ship, etc.)	0	0	0	0	0	0	0	6	7	5	2	0
4. School (Teachers and staffs must choose 2.)	0	2	0	0	0	0	1	5	0	0	0	0
5. Hospital, Welfare facility or Care facility (Staffs must choose 2.)	0	0	0	0	0	1	0	0	0	0	0	0
6. Inside other buildings (Shop, Public service place, Theater, etc.)	0	0	0	0	0	0	0	3	4	7	0	0
7. Moving on foot or riding bicycle	0	2	0	0	1	0	0	1	1	0	0	0
8. Driving a car or a motorbike	0	2	0	0	0	0	0	8	1	3	1	1
9. Traveling by bus	0	0	0	0	0	0	1	0	0	0	0	0
10. Other()	0	4	2	1	0	0	0	5	0	0	1	0

Table 7. Matrix of location, age and gender

(4) Distribution of responders at the time of the earthquake

Table 8 shows the location of the responders in each zone. We must be careful that the responder who was interviewed in zone A can be located at his /her home or working place in another zone.

			Female	;				Male		
	Α	В	С	D	Е	А	В	С	D	Е
1. Your home (including shop or office which is combined with your home)	76.2	75.9	75.9	51.6	50.0	46.3	44.5	40.5	38.8	40.9
2. Working place inside a building (office, factory, shop etc.)	9.5	12.4	10.3	25.8	21.4	18.5	24.0	21.4	35.8	27.3
3. Outdoor working place (harbor, outdoor factory, field, ship, etc.)	2.4	1.5	5.7	12.9	7.1	9.3	10.0	11.9	3.0	4.5
4. School (Teachers and staffs must choose 2.)	0.0	0.7	1.1	0.0	7.1	1.9	3.0	3.2	3.0	4.5
5. Hospital, Welfare facility or Care facility (Staffs must choose 2.)	2.4	0.0	2.3	3.2	0.0	5.6	7.0	8.7	10.4	4.5
6. Inside other buildings (Shop, Public service place, Theater, etc.)	0.0	2.2	1.1	0.0	0.0	3.7	1.0	2.4	0.0	0.0
7. Moving on foot or riding bicycle	7.1	1.5	2.3	4.8	7.1	11.1	7.0	6.3	7.5	4.5
8. Driving a car or a motorbike	0.0	0.0	0.0	0.0	7.1	0.0	0.5	0.0	0.0	4.5
9. Traveling by bus	2.4	5.1	1.1	1.6	0.0	3.7	3.0	5.6	0.0	9.1
10. Other ()	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0
Number of sample	42	137	87	62	14	54	200	126	67	22

Table 8. Location of responders

- About three quarters of the female responders in the zone A, B and C were at home (color yellow) and about 45 percent of male responders stayed home.
- In the zone D and E, the ratio of the stay-at-home wife decreased and women in their working place increased (color orange). In the zone D, male responders who were in working place also increased (color green). The zone D may be an area of Salaried workers.
- It is mysterious that "Moving on foot or riding bicycle" in the zone A is higher than other zone (color blue).

2.6 Estimation of location of the people in Banda Aceh at the time of the earthquake

As for the conclusion of the discussion in this chapter, location of the people at the time of the earthquake is assumed to be as follows



Figure 6. Location of the people at the time of the earthquake

3. Data about Evacuation

3.1. Evacuation features according to the zone and gender

(1) Action according to the zone and gender

Gender		Fe	emale(%	%)		Male(%)				
Action	А	В	С	D	Е	А	В	C	D	Е
1. Yes. I tried to evacuate toward inland.	64.3	72.3	65.5	67.7	42.9	68.5	57.5	49.2	38.8	54.5
2. Yes. I tried to evacuate toward large and high building or tsunami evacuation tower	11.9	6.6	1.1	8.1	7.1	9.3	3.5	4.8	6.0	0.0
3. Yes. I tried to evacuate toward mosque	14.3	3.6	16.1	8.1	21.4	16.7	8.0	15.1	10.4	9.1
Sub-total of "evacuate"	90.5	82.5	82.7	83.9	71.4	94.5	69.0	69.1	55.2	63.6
4. No. I moved to upper floor of my house	0.0	2.2	1.1	1.6	0.0	0.0	2.0	3.2	1.5	4.5
5. No. I moved to upper floor of the building where I was at the time of the earthquake.	0.0	1.5	0.0	6.5	0.0	0.0	0.5	1.6	1.5	0.0
6. No. I was in safe place.	0.0	1.5	1.1	3.2	0.0	0.0	5.5	7.1	13.4	4.5
7. No. I did not evacuate. I did not move at all.	2.4	4.4	3.4	0.0	7.1	1.9	7.0	8.7	3.0	4.5
8. No. I went out the building where I was, but stayed near the building.	7.1	8.0	11.5	4.8	21.4	3.7	16.0	10.3	25.4	22.7
Sub-total of "Not evacuate"	9.5	17.6	17.1	16.1	28.5	5.6	31.0	30.9	44.8	36.2
Number of sample	42	137	87	62	14	54	200	126	67	22

m . 1. 1	\cap	D	. C		· · · · · · 1 · · · ·			1	
' ania '	ч	Parcantaga	OT OV 9 C 119	ation	according t	η τησ	70n0 9	nna	CONCOR
Table	υ.	I UIUUIIIIagu	or cracua		according i		LUIIC 6	ana	gunuur
		<i>(</i>)			<i>(</i>)				()

• It is quite natural that most of the responders in the zone A evacuated (color yellow).

• The two thirds of the responders in the zone A and B evacuated towards inland. Around 55% of the responders in the zone C and D went to inland too (color orange).

- About 25% of the responders in the zone A utilized mosques and high buildings as their evacuation-places. It was a little larger percentage than those in the other zone (color blue).
- Male seems more optimistic than female, however, it is worried that 31% of male responders in the zone B and C did not evacuated although there might be no way to survive for them unless evacuating (color green).
- The responders of the zone C went to mosques a little more than the other zone. This might come from the large mosques being located in this zone (color peach).
- Some female responders in zone A did not evacuate although people in this area cannot survive unless evacuating (color grey). These people might need a help in order to evacuate.

(2) Feature of group evacuation

Zone With whom? (multi ans.)	А	В	С	D	Е
Alone	15.3%	14.4%	14.2%	24.7%	16.0%
With my family	51.4%	64.2%	62.3%	43.3%	40.0%
With colleagues in the working place	8.1%	8.1%	6.2%	15.5%	8.0%
With neighbors	19.8%	8.1%	11.1%	7.2%	0.0%
With school mates	4.5%	4.4%	4.9%	9.3%	28.0%
With a designated leader of evacuation	0.0%	0.0%	0.0%	0.0%	0.0%
Other	0.9%	0.7%	1.2%	0.0%	8.0%
Number of sample	111	271	162	97	25

Table 10. With whom people evacuated?

- Nearly half of the people evacuated with their family.
- 20% of the people in the zone A evacuated with neighbors. Some areas in this zone might have good community preparedness (color yellow, Village name: Alue Deah Teungoh, Alue Naga, Blang Oi, Deah Baro, Lampaseh Kota).
- · 28% of the people in the zone E evacuated with their school-mates. The zone E is the university area and those responders might be students (color orange).
- There was no contribution from the designated leader such as community leader, teacher, police, staff of disaster response team etc (color green).

3.2 Evacuation method

No. of sample

Table 11. Evacuation methods according to the zone and the gender										
Gender		Female (%)					Male (%)			
Method	А	В	С	D	Е	А	В	С	D	Е
1. Walking or running	5.3	8.8	14.1	21.2	10.0	16.0	7.9	22.1	10.5	13.3
2. Bicycle	2.6	2.7	1.4	1.9	0.0	4.0	2.1	0.0	0.0	0.0
3. Motor bike	76.3	82.3	62.0	65.4	80.0	68.0	82.9	58.1	78.9	80.0
4. Driving a car	7.9	4.4	16.9	3.8	10.0	8.0	5.7	12.8	7.9	6.7
5. Getting a ride in a car	7.9	1.8	5.6	7.7	0.0	4.0	1.4	7.0	2.6	0.0

• The 70-80% of the responders (Female + Male) in the zone A, B, D and E did evacuation using motor bikes (color yellow).

71

52

10

50

140

• Exceptionally in the zone C, the 40% did evacuation by walking (18%) or by driving (22%). Among the 29 walkers of the zone C, the 21 persons went to mosque, the 5 went to high building and the remaining 3 went inland (color orange).

15

86

38

- · Considerable number of responders in the zone A (10/88) did evacuation by walking although this zone was the nearest zone to the sea (color blue). The 6 persons of 10 walkers of the zone A went to mosque, the two of 10 went to high building and the remaining two went inland.
- Mosques in Banda Aceh seem to have important role to be evacuation places.

38

113

3.3 Time of starting evacuation

(1) Time of starting evacuation, gender and zone



Figure 7. Distribution of the start time of female and male in the five zones (Number of persons who did not evacuate was excluded from the sample)

- In the zone A, B and C, around a half of the responders started their evacuation 5-10 minutes after the earthquake. 20 percent of them started at 0-5 minutes. And the remaining 20-30 percent started at 10-20 minutes.
- The male responders of the zone D started a little later than those of the zone A, B and C.
- The responders of the zone E started evacuation irregularly. The number of sample may be too small.
- (2) Time of starting evacuation, evacuation method and age







- Most of the responders who did evacuation by bicycle, motor bike and car started evacuation 5-10 minutes after the earthquake, however, the start time of the walking persons stretched to 10-20 minutes.
- Age effect to the time of starting evacuation was not clear. There were a little delay of start (20-40 minutes) in age 10s and over 50s.

3.4 Total time needed for evacuation

(1) Total time for evacuation corresponding to start-zone and destination



- Some responders in the zone A completed their evacuation within 20minutes. They were estimated to go to mosques and high buildings nearby. The people in this zone might know the difficulty of reaching a safe inland.
- · Most of the responders in the zone B and C went inland and they needed more than 40 minutes.
- Many responders in the zone D got their destination in around 30 minutes. They might have an advantage that their starting places were nearer inland.
- Figure 11 clearly show the difference of the time needed for evacuation to the destinations.
- (2) Total time for evacuation corresponding to evacuation method and traffic jam

	Walking	Bicycle	Motor bike	Car	Total
I was trapped in traffic jam at least once.	19.2%	72.7%	85.4%	93.2%	77.7%
I was not trapped in a traffic jam, but I saw cars and motor bikes which could not move in a traffic jam.	25.6%	0.0%	10.8%	6.8%	12.0%
I was not trapped in nor see a traffic jam	55.1%	27.3%	3.8%	0.0%	10.2%
Number of sample	78	11	452	74	615

Table 12. Evacuation method and traffic jam







Figure 13. Difference of evacuation time "Trapped in traffic jam" case



• 93% of the car users and 85% of the motor bike users were trapped in traffic jam during their evacuation (color yellow).

- Figure 12 shows that most of the responders who did evacuation by walking completed evacuation within 20 minutes. They were estimated to have gone to the mosques and the high buildings nearby. The responders who used motor bike and car needed more than 40 minutes.
- Figure 14 is the cases that the responders were not trapped in traffic jam. The number of sample is limited, but motor bike evacuees could reach their destination around 30 minutes and car evacuees might be earlier.
- Figure 15 shows the time that responders spent in the traffic jams. About 19% of the responders who walked were trapped by traffic jam. Although the number of sample is small, but some of them seemed to spend 15-30 minutes in traffic jam. A heavy traffic that people could not walk so long might have occurred.
- The car evacuation seemed to lose a little more time than the motor bike evacuation once it was trapped in traffic jam.

3.5 Effect of returning to home and/or going to school

(1) Actions before starting evacuation sorted by their location

Location at the time of the earthquake What you did before starting evacuation?	Staying at home	Working in door	Working outdoor	Other building indoor	Travel and others	Total	Total/ Respon- der
Started to evacuate without doing any things	148	46	13	23	32	262	32.2%
Returned to my home from a working place or a visiting place.	18	29	5	8	17	77	9.5%
Helped family to start evacuation.	64	17	3	4	14	102	12.5%
Went to school or outside place to pick my family up.	41	12	10	4	17	84	10.3%
Went to the coast to look at the sea.	2	3	0	0	1	6	0.7%
Packed luggage (money, passbook, personal seal, food, clothing, medicine, radio, etc.)	114	22	8	5	11	160	19.7%
Put scattered goods by the earthquake in order	5	4		1	2	12	1.5%
Locked my house	238	34	13	10	22	317	39.0%
Locked my working place, shop, or factory	22	20	0	1	2	45	5.5%
Let staff of my shop or factory to evacuate	3	7	0	0	0	10	1.2%
Made phone calls or sent mails to my family and/or friend	55	15	4	11	14	99	12.2%
Shouted out to let neighbors evacuate	22	5	1	3	3	34	3.8%
Helped neighbor who needed nursing care to evacuate	2	2	0	0	2	6	0.7%
Number of answers (multiple answer)	443	164	43	75	137	1214	/813

Table 13. Matrix of the actions before evacuation (multiple answers)

and the location at the earthquake

- People who went back to home and/or who went to school to pick up their children were around 10 % each (color orange).
- Some persons were staying at home and returned to home. The "staying at home" may include "once go to school, then return to home" and "staying around their house" (color yellow).
- (2) Effect of returning to home and/or going to school sorted by "staying at home" or "staying out"





Staying at home evacuees





Staying at home evacuees

Figure 19. Total time needed for evacuation Staying out evacuees

- Most people who were at home when the earthquake occurred started evacuation within 10 minutes. Some of them who went to school to pick up children were late 20-40 minutes (Figure 16).
- The people who were staying out were a little late to start. Many of the people who returned home and went to school were late to start 10-20 minutes (Figure 17).
- Many of the people who returned to home and went to school finished evacuation less than 20 minutes. They might have gone to a mosque or a building nearby. They must have seen the heavy traffic jam on the way to their home, and given up going inland (Figure 19).

(3) Actions of female and male at the urgent evacuation

Location at the time of the earthquake	Staying	at home	Stayir	ng out	
Gender What you did before starting evacuation?	Female	Male	Female	Male	Total
Started to evacuate without doing any things	32.2%	34.8%	37.6%	28.3%	32.2%
Returned to my home from a working place or a visiting place.	2.1%	6.5%	14.9%	16.4%	9.5%
Helped family to start evacuation.	14.9%	13.9%	6.9%	11.5%	12.5%
Went to school or outside place to pick my family up.	7.9%	10.9%	7.9%	13.0%	10.3%
Went to the coast to look at the sea.	0.0%	1.0%	1.0%	1.1%	0.7%
Packed luggage (money, passbook, personal seal, food, clothing, medicine, radio, flashlight, etc.)	33.1%	16.9%	9.9%	13.4%	19.7%
Put scattered goods by the earthquake in order	1.7%	0.5%	2.0%	1.9%	1.5%
Locked my house	59.9%	46.3%	19.8%	21.9%	39.0%
Locked my working place, shop, or factory	5.0%	5.0%	6.9%	5.9%	5.5%
Let staff of my shop or factory to evacuate	1.2%	0.0%	3.0%	1.5%	1.2%
Made phone calls or sent mails to my family and/or friend	12.0%	12.9%	10.9%	12.3%	12.2%
Shouted out to let neighbors evacuate	5.8%	4.0%	2.0%	2.6%	3.8%
Helped neighbor who needed nursing care to evacuate	0.0%	1.0%	1.0%	1.1%	0.7%
Number of responders	242	201	101	269	813

Table 14. Relation among the actions (multiple answers), the location, and gender

- Many of the female responders who were staying out did evacuation without doing anything (color green in Table 14).
- Packing luggage and locking house seemed to be women's tasks while they were staying in their home (color orange in Table 14). This is same as an average Japanese home.
- · Going to school to pick up children seemed to be men's work (color blue in Table 14).

3.6 Changing of route or destination for evacuation

	Starting time (minutes after the earthquake)						All
Could you go to the final destination you intended?	0-5	5-10	10-20	20-40	40-60	60-	
Yes, I went to my destination using the route which I intended.	63.2 (%)	54.6 (%)	53.9 (%)	53.5 (%)	33.3 (%)	57.1 (%)	55.8 (%)
Yes, I went to my destination, but I changed the route that I first intended because of traffic jams	23.1	25.0	29.9	18.6	50.0	28.6	25.7
No. I changed my destination because of traffic jams.	2.6	5.3	5.2	18.6	0.0	0.0	5.6
No. I could not reach any destination because of traffic jams.	4.3	1.4	1.9	2.3	0.0	0.0	2.1
No. I quitted evacuation on the way and returned, because I thought that tsunami would not come.	1.7	1.1	1.9	0.0	0.0	0.0	1.3
I evacuated, but did not have any clear destination.	5.1	12.7	7.1	7.0	16.7	14.3	9.5
Number of sample	117	284	154	43	6	7	611

Table 15. Effect of the delay of the starting evacuation to the route or destination change

Table 16. Effect of the start zone to the route or destination change

Could you go to the final destination you intended?		В	C	D	Е	All
Yes, I went to my destination using the route which I intended.	48.3 (%)	57.9% (5)	52.2% (5)	63.3 (%)	60.0 (%)	56.0 (%)
Yes, I went to my destination, but I changed the route that I first intended because of traffic jams	32.2	23.4	31.8	14.4	20.0	25.4
No. I changed my destination because of traffic jams.	9.2	6.3	3.8	5.6	0.0	5.7
No. I could not reach any destination because of traffic jams.	1.1	1.2	2.5	4.4	4.0	2.1
No. I quitted evacuation on the way and returned, because I thought that tsunami would not come.	0.0	1.2	1.9	0.0	8.0	1.3
I evacuated, but did not have any clear destination.	9.2	9.9	7.6	12.2	8.0	9.5
	87	252	157	90	25	611

• The more the start was delayed, the more the difficulty to reach the destination increased (color yellow in Table 15)

• A half of the responders in the zone A, the nearest zone to the coast, were forced to change their destination or their route (color orange in Table 16).

3.7 Reasons not to evacuate

Gender		Female (%)				Ν	/Iale (%)		
Why you did not evacuate? Zone	А	В	C	D	Е	А	В	С	D	Е
I thought the tsunami would not come to my place.	4.8	8	6.9	9.7	21.4	5.6	9.5	17.5	31.3	18.2
I thought I should start to evacuate after I could confirm tsunami coming.	0	2.2	4.6	0	7.1	1.9	11.5	7.9	6	0
I took too much time to prepare the evacuation.	0	0	0	1.6	0	0	0	0.8	1.5	0
I was waiting my family or relatives coming to help me or to join me.	0	2.9	1.1	0	0	0	1	0.8	0	4.5
I was looking my family and/or relatives.	0	0.7	0	1.6	0	0	1.5	0	0	0
I went to a school, hospital or some other place to pick up my family.	0	0	0	0	0	0	1.5	1.6	0	0
I thought I would be safe by escaping to upper floor of the building which I was in.	0	2.9	3.4	3.2	0	0	3.5	4.8	4.5	9.1
I thought I could not reach to an evacuation place before tsunami would arrive.	0	0.7	1.1	0	0	0	0	0	0	0
I could not leave a duty place.	0	0	0	1.6	0	0	1	0	4.5	0
I evacuated	95.2	82.5	82.8	82.3	71.4	92.6	70.5	66.7	52.2	68.2
Number of sample	42	137	87	62	14	54	200	126	67	22

Table 17. Reason not evacuating

• The more the people were inland, the more they believed they were in safe area. This tendency was quite natural. However, around 9% of the people in the zone B believed their safety and 11.5% of the male in the zone B waited and saw(color yellow). These would be the budding of the next tragedy.

4. Data about Information Propagation

4.1 Tsunami alert

(1) Tsunami siren

	А	В	С	D	Е
Yes I heard and believed it as a signal of tsunami coming.	42.7%	24.6%	16.4%	31.0%	36.1%
Yes I heard but I did not believe it.	11.5%	11.3%	12.2%	12.4%	13.9%
No I did not hear.	45.8%	64.1%	71.4%	55.8%	50.0%
Number of sample	96	337	213	129	36

m 1 1	10	m ·	•
Table	18.	Tsunami	siren

• One of the officers of Banda Aceh said that the sirens were switched on 30-40 minutes after the earthquake. Therefore, the responder who evacuated earlier could not hear the siren in the city. This may be the reason that the larger number of responder in the zone B and C did not hear the siren(color yellow).

• Among the responders who heard siren, many of them understood it as a signal of tsunami coming(color orange).

(2) BMKG (Agency for Meteorology, Climatology and Geophysics) tsunami alert

The earthquake occurred at 15:38:33 (local time) on April 11, 2012. BMKG issued tsunami alert five minutes after the break out, namely 15:43 of the earthquake. The designated areas were Aceh, North Sumatra, West Sumatra, Bengkulu and Lampung. BMKG continued the alert and terminated it at 17:38. However, the maximum aftershock Mw 8.2 occurred at 17:43:06 and BMKG extended the alert until 19:45 (news source: Serumbi Indonesia webpage, April 11, 20:19).

	Female	Male
Yes. I noticed that the alert was issued after I had evacuated.	24.2%	16.6%
Yes. I heard that the alert was issued before starting evacuation, or while evacuating.	30.3%	32.6%
No. I did not notice the alert.	33.8%	39.4%
I could not notice such things because I was shocked by the earthquake.	11.7%	11.5%
Number of sample	343	470

Table 19. Receipt of the tsunami alert

• Many respondents started evacuation until ten minutes after the earthquake. Therefore, most of the respondents who noticed the tsunami alert must have heard it after they started evacuation.

• The second question should be divided into two, namely "Yes, before starting" and "Yes, but while evacuating".

(3) Tool to get information

	Fi	rst	Second		
Source	Female	Male	Female	Male	
TV	9.3%	9.0%	5.2%	3.8%	
Radio	1.7%	2.3%	2.9%	2.6%	
Outdoor or car mounted loud speaker	2.6%	2.9%	3.2%	4.3%	
Tsunami siren	20.1%	14.9%	9.0%	12.4%	
Call out by officials or community leaders	1.2%	1.3%	1.8%	1.0%	
SMS, E-mail, Web from public	3.8%	4.5%	3.2%	4.1%	
Telephone, SMS, E-mail from private	7.3%	13.0%	22.5%	23.1%	
Talking or shouting of neighbors	50.1%	48.2%	48.7%	45.2%	
Others	3.8%	3.9%	3.5%	3.7%	
Number of sample	343	469	343	469	

Table 20. The first and second sources from which responders got information of tsunami-alert

- The responders got information mainly from rumor dispersed by word of mouth (color yellow). This poor information environment is dangerous with easily triggering a panic by incorrect information.
- Official information sources were limited to the siren and TV (color orange).
- It should be remarked that not a few people got the information from the sirens although they were switched on at 30-40 minutes after the earthquake. The sirens have to be maintained so as to be switched on as soon as the tsunami alert is issued from BMKG.

4.2 Trigger of starting evacuation

(1) People's first impression

Gender			Female			Male					
Zone	А	В	С	D	Е	А	В	С	D	Е	
Yes, I thought a tsunami would come as large as 2004 tsunami.	52.4	53.3	49.4	43.5	28.6	51.9	40.5	24.6	25.4	40.9	
Yes, I thought a tsunami would come, but not so large as 2004 tsunami.	35.7	38.7	42.5	41.9	21.4	35.2	38.5	47.6	40.3	36.4	
No. I did not think a tsunami would come.	7.1	4.4	6.9	12.9	42.9	9.3	17.0	24.6	28.4	22.7	
No. I did not think about tsunami at all.	4.8	2.9	1.1	1.6	7.1	3.7	4.0	3.2	4.5	0.0	
Number of sample	42	137	87	62	14	54	200	126	67	22	

Table21. Did you think tsunami would come when the earthquake broke out?

- People in the zone A and B had higher awareness about the risk of tsunami than other area (color yellow).
- The males in the zone C and D might be more optimistic than others (color orange). Same tendency was already seen in Table 9.

Gender			Female	e e e e e e e e e e e e e e e e e e e				Male		
Zone	А	В	С	D	Е	А	В	С	D	Е
1. Because I felt strong and long shaking.	21.1	52.2	50.7	40.4	30.0	36.0	47.1	44.2	15.8	33.3
2. Because I heard tsunami siren.	15.8	10.6	11.3	13.5	0.0	16.0	11.4	7	5.3	6.7
3. Because I heard that a large tsunami alert had been issued from an outdoor loud speaker, radio, TV, e-mail, SMS, Web or something else.	10.5	7.1	5.6	7.7	10.0	2.0	5.7	11.6	21.1	0.0
4. Because I saw neighbors or many people evacuating.	44.7	25.7	16.9	32.7	50.0	28.0	27.1	26.7	42.1	33.3
5. Because my family insisted that we should evacuate.	2.6	2.7	8.5	3.8	10.0	14.0	2.9	9.3	15.8	6.7
6. Because I was persuaded to evacuate by a neighbor, a community leader, or a religious leader.	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7
7. Because I was persuaded to evacuate by a autonomy disaster prevention staff, police, firebrigade or city office staff.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number of sample	38	113	71	52	10	50	140	86	38	15

Table 22. What was the most important reason for you to have decided to start evacuation?

• Majority of people decided to start evacuation by feeling the strong earthquake (color yellow).

- But, not a few people decided to start by seeing other people evacuating (color orange).
- It is strange that the people in the zone A depended less on their feeling and depended more on the siren and others' action (color green). We must make clear that the siren of this zone was switched on earlier than the other area or not.
- Staffs of public sectors did no contribution in letting people evacuate (color blue).
- (3) Experience of 2004 great tsunami and disaster drill

Zone	Zone (%)								
Did you or your family experience the 2004 Indian Ocean Great Tsunami?	А	В	С	D	Е				
Yes	79.2	72.7	69.0	49.6	30.6				
No	20.8	27.3	31.0	50.4	69.4				
Number of sample	96	337	213	129	36				

Table23. Percentage of the experienced/not-experienced the 2004 giant tsunami

• There is a clear tendency that the people who experienced the 2004 giant tsunami live on a nearer land to the sea than those who did not experienced. This looks strange because the people who experienced must know the risk of tsunami much more. The original citizens of Banda Aceh may live on their ancestral land and the new comers may live inland.

Table 24. Relation between the participation to the disaster drill and the zone

Zone	Zone(%)									
I have;	А	В	C	D	Е					
participated more than once	22.9	10.7	16.4	10.1	5.6					
participated once	31.3	17.2	8.5	14.0	11.1					
not participated	45.8	72.1	75.1	76.0	83.3					
Number of sample	96	337	213	129	36					



Figure 20. Relation between the participation of disaster drill and the experience of 2004 tsunami



Figure 21. Relation between the experience of the great tsunami and the time of the starting evacuation



Figure 22. Relation between the participation of the disaster drill and the time of the starting evacuation

- The participation to the disaster drill is generally low. However, the participation of the people in the zone A is higher than those in other zones. This might come from the awareness of the community people and the effort of the activists for disaster mitigation education.
- The people who experienced the 2004 giant tsunami participated to the disaster drill a little more than those not experienced.
- The people who did not participate to the drill started evacuation a little more slowly or did not evacuate.

(4) Experience of the 2004 giant tsunami, response and preparedness

Did you talk to people who had not started to evacuate?	Experienced	Not experienced
Yes, I talked to them to let them evacuate.	76.7%	72.5%
Yes, I talked to them and helped them to evacuate.	7.5%	6.2%
No, I did not because I did not have any allowance.	15.8%	21.2%
Number of sample	425	193

Table 25. Experience of the 2004 tsunami and response (help others)

Table 26. Experience of the 2004 tsunami and preparedness in each family

Had you spoken about tsunami with your family	Experienced	Not experienced
Yes, my family and I had spoken about tsunami and had decided where we should evacuate and how to communicate each other.	47.4%	44.7%
Yes, my family and I had spoken about tsunami, but we did not decide actual response.	32.2%	25.3%
No. I did not speak about tsunami with my family so much.	11.0%	14.3%
No. I did not speak about tsunami with my family at all.	9.4%	15.6%
Number of sample	500	237

- Most persons seemed to be evacuating with calling to each other.
- The persons who experienced the 2004 giant tsunami talked to their neighbors a little more frequently than the persons not experienced.
- The persons who experienced had spoken about tsunami with their family a little more than those not experienced. However, even the experienced persons, a half of them had not decided such important private rules as evacuation place and method to communicate with their family.
- (5) Knowledge and educational background

Gender		Fe	emale (%	6)		Male (%)					
Educational background	А	В	С	D	Е	А	В	С	D	Е	
Bachelor, Magister, Doctor	21.4	10.2	17.2	27.4	35.7	13.0	15.5	24.6	35.8	40.9	
Diploma	2.4	7.3	10.3	14.5	0.0	0.0	5.0	4.8	4.5	9.1	
Senior High School	66.7	45.3	50.6	45.2	64.3	63.0	52.0	51.6	53.7	45.5	
Junior High School	9.5	22.6	16.1	6.5	0.0	20.4	17.5	8.7	6.0	0.0	
Elementary High School	0.0	14.6	5.7	6.5	0.0	3.7	10.0	10.3	0.0	4.5	
Number of sample	42	137	87	62	14	54	200	126	67	22	

Table 27. Educational background, gender and the zoon



Figure 23. Educational background and age

 The persons who have higher educational background decreased from inland to coastal area except the female of the zone A (color yellow). This data might include incorrect answers or misunderstanding (Interviewer: Suryadi, Ulee Lheeu 4, Deah Baro 1, Alue Deah Teungoh 1).

• The persons who had lower educational background were elder than 30-40.

Educational background	Bachelor, Magister,	Diploma	Senior High	Junior High	Elementary
and tsunami effective for your response?	Doctor		School	School	High School
It was effective or somewhat effective.	43.2%	48.0%	37.0%	22.8%	10.8%
It was not effective so much or not at all.	30.2%	22.0%	37.9%	27.2%	9.2%
I did not have the knowledge because no opportunity to learn.	10.5%	18.0%	16.4%	39.5%	70.8%
I did not have the knowledge. I do not remember whether I have learned or not.	16.0%	12.0%	8.8%	10.5%	9.2%
Number of sample (All zone)	162	50	422	114	65

Table 28. Educational background and evaluation of knowledge about earthquake and tsunami

Table 29. Educational background and practice of evacuation

Educational background Practice of evacuation	Bachelor Magister Doctor	Diploma	Senior High School	Junior High School	Elementary High School
Evacuated	69.2%	91.4%	76.7%	80.2%	53.4%
Not evacuated	30.8%	8.6%	23.3%	19.8%	46.6%
Number of sample (Zone B and C)	91	35	275	91	58

Only the data from the zone B and C was used, because the ratio of evacuation of other zone deviated.

	If you had kno	wledge about ts	unami, was it el	ffective?	I did not have the knowledge.				
Time of starting (minutes)	It was effective.	It was somewhat effective.	It was not effective so much.	It was not effective at all.	Because no opportunity to learn.	I do not remember.			
0-5	19.4%	13.6%	13.5%	14.3%	13.4%	11.5%			
5-10	31.5%	38.1%	36.9%	40.0%	32.3%	36.8%			
10-20	23.6%	28.8%	16.7%	22.9%	10.8%	18.4%			
20-40	4.8%	3.4%	7.7%	8.6%	3.2%	5.7%			
40-60	1.2%	1.7%	0.5%	0.0%	0.0%	1.1%			
60-	1.8%	0.0%	0.5%	0.0%	1.1%	1.1%			
Not evacuated	17.6%	14.4%	24.3%	14.3%	39.2%	25.3%			
Number of sample	165	118	222	35	186	87			

Table 30. Knowledge about tsunami and the time of starting evacuation

• Persons who had higher education background were positive to having their knowledge (color peach in Table 28).

- Persons who had lower education background complained with the lack of opportunity to learn about earthquake and tsunami (color yellow in Table 28).
- The highest education and the lowest education persons inclined to not evacuating (color orange and green in Table 29). The bachelors seemed indirect. The persons who finished only elementary high school were elder and seemed difficult to evacuate.
- The persons who did not have knowledge about earthquake and tsunami inclined to not evacuating (color blue in Table 30).
- There was not a clear relation between the knowledge about tsunami and the starting time of evacuation (Table 30).

4.3 Information from TV

Some areas in Banda Aceh, mainly the downtown area, seemed not to have lost the electric power, and people in the areas could get information about the earthquake and tsunami after the shaking.



Figure 24. Villages where TV could work

Table 31.	Vallages	where	some of	the	responders	got	inform	ation	from	ΤV	first	t
-----------	----------	-------	---------	-----	------------	-----	--------	-------	------	----	-------	---

Village			Village			Village			Village		
Deah Glumpang	1	2	Gampoeng Blang	3	9	Kuta Alam	14	18	Merduati	2	11
Alue Deah Teungoh	2	15	Gampoeng Pie	1	3	Lambaro Skep	10	26	Meuraxa	0	2
Alue Naga	0	42	Gampong Jawa	0	17	Lambung	0	8	Peulanggahan	2	23
Asoe Nanggroe	0	5	Gampong Pande	0	10	lamdingin	0	1	Peunayong	16	21
Bandar Baru	4	11	Gampong Surien	1	4	Lamdingin	3	34	Peurada	0	30
Beurawe	2	4	Ie Masen Kayee Adang	0	2	Lamgugob	1	27	Prada lamnyong	0	1
Blang Dayah	0	4	Jeulingke	2	43	Lamnyong	3	8	Punge Blang Cut	0	5
Blang Oi	1	15	Keudah	1	14	Lampaseh Aceh	1	37	Punge Jurong	1	22
Chik Dipeunayong	1	2	Kp, Keramat	0	9	Lampaseh Kota	13	18	Punge Ujong	0	5
Darussalam	3	14	Kp, Laksana	2	15	Lampineung	0	8	Rukoh	0	43
Deah Baro	1	15	Kp, Mulia	0	40	Lampriet	9	33	Tibang	1	22
Deah Raya	2	4	Kp, Pineung	0	2	Lampulo	7	102	Ulee Lheeu	0	5
Gampoeng Baro	0	1									
	ZΣ	Δ									

Number of responders in the village.

□ Number of responders who got information from TV first.

Some of TV stations had a live program (Breaking news ex: Metro TV and TV one) as well as running text. In the breaking news program, the TV's anchor interviewed the BMKG staff. So they get the real time information from BMKG (commented by Nur Fadli).

Table 32.	Transmission	of the	tsunami	alert	through	TV

BMKG (Agency for Meteorology, Climatology and Geophysics) issued a large tsunami alert around ? minutes after the 2012/4/11 earthquake. Did you notice the large tsunami alert?		all
Yes. I noticed that the alert was issued after I had evacuated.		19.7%
Yes. I heard that the alert was issued before I began to evacuate, or while I was evacuating.		31.7%
No. I did not notice the alert.		37.1%
I could not notice such things because I was shocked by the earthquake.		11.6%
Number of sample	74	812

Table 33. People's reliance to BMKG

Had you believed the tsunami alert issued by BMKG?		all
Yes. I checked what was announced by BMKG.		13.2%
Yes. But, at the time of April 11 earthquake, there was no way for me to check what was announced by BMKG.		45.2%
No. But I checked what was announced by BMKG as reference.		14.5%
No. I did not pay any attention about the announcement issued by BMKG.		10.8%
No. I did not know that BMKG issued such information.		10.6%
No. I did not know BMKG at all.		5.7%
Number of sample		812

Table 34. Evacuation ratio of the responders who got information from TV first

	watch TV	all
Evacuated	78.4%	75.2%
Not evacuated	21.6%	24.8%
No. of sample	74	812



Figure 25. Relation between the time of starting evacuation and getting information fromTV

Table 35. Trigger of starting evacuation and the information from TV

What was the most important reason for you to have decided to start evacuation?		all
Because I felt strong and long shaking.		42.2%
Because I heard tsunami siren.		10.7%
Because I heard that a large tsunami alert had been issued from an outdoor loud speaker, radio, TV, e-mail, SMS, Web or something else.		7.8%
Because I saw neighbors or many people evacuating.		28.7%
Because my family insisted that we should evacuate.		6.7%
Because I was persuaded to evacuate by a neighbor, a community leader, or a religious leader.		0.5%
Because I was persuaded to evacuate by autonomy disaster prevention staff, police, fireman or city office staff.		0.0%
Other	6.8%	3.3%
Number of sample		614

- · Most of the responders who could watch TV got the alert of tsunami (color yellow in Table 32).
- Considerable number of the responders did not rely on BMKG, but they needed the information from BMKG in any ways (color yellow in Table 33).
- Some TV channels seemed not to have broadcasted the proper information about the tsunami alert (color orang in Table 33).
- The ratio of doing evacuation of the responder who watched TV was a little higher than those who could not watch (Table 34).
- The time starting evacuation became a little later in the case watching TV. This might become from the slow processing of the emergency information of the TV channel (Figure 32).
- People utilized the information not only from TV but also from the siren (color yellow of Table 35). However, it is important to notice that people tended to rely on the concrete information, not on feeling and on others' movements, when they got information from TV (color orange in Table 35).

5. Evacuation Route Drawing

5.1 Drawing method

We asked responders to draw his/her evacuation route to a map. Then, the interviewer input the route to a digital road network map using the evacuation route input system developed by VRI Inc. The input system has a function to create the node and path link of shortest route from the origin node and the terminal node. Therefore, the interviewer can create the evacuation route chaining several paths by connecting the new origin node to the former terminal node. The created evacuation route data were stored in the mass storage of the computer and can be drawn in JPG image.

5.2 All data

We input 612 data. All data are shown in Figure 26-28. Because of the big number of data, the routes were drawn on the three figures.

Red dots denote the starting points and the blue dots denote the termination points. The pink lines are evacuation routes. The color of pink becomes stronger if the route of evacuee overlapped each other.



Figure 26. Data 0-200, the order of the data is random, having no meaning.



Figure 27. Data 201-400, the order of the data is random, having no meaning.



Figure 28. Data 401-611, the order of the data is random, having no meaning.

5.3 Estimation on traffic jam area

(1) Overview discussion

Figure 29 shows the routes which took more than one hour to finish, and Figure 30 shows the routes which finished in less than 20 minutes. The delay start more than 20 minutes was excluded from both cases in order to synchronize the evacuation timing. We can obviously know that the start points and the termination points were separated into coastal side and inland side in the case of

more than one hour whereas they were not separated in the case less than 20 minutes. In other words, if people intended to go inland from the coastal side, they had spent much time in order to cross the main roads which extend from north west to south east, namely, Jl. T. Nyak Arief, Jl Tgk.H.Daoed Beureue, Jl. Teuku Umar and Jl. Cut Nyak Dhien.

In the case less than 20 minutes, people in the coastal side seemed to go to a building or a mosque. This selection of the destinations might be good from the view point of efficient evacuation. However, before recommending this selection, we should carefully check and qualify the buildings and mosques as being safe vertical evacuation places.



Figure 29. The routes which took more than one hour to finish



Figure 30. The routes which finished in less than 20 minutes

(2) Estimation of traffic jam area

The road which could reach the destination in less than 20 minutes has a potential not to be included to the route which needed more than one hour. Therefore, we can estimate the traffic jam road by subtracting the route of the "less than 20 minutes" from the route of the "more than one hour". Figure 31 is the result which was drawn moderately not to overestimate the traffic jam places. The south west region of the map has less data, therefore traffic jam might be underestimated.



Figure 31. Estimated traffic jam area

6. Task from Now and Next Report

(1) The data, analyses and discussion introduced in this second quick report are hoped to be reviewed by the professionals of Banda Aceh and Jakarta in order to be brushed up. Some social data of Banda Aceh should be added and discussed. Then, the improved conclusions and recommendations would be included in the next report.

(2) The evacuation drawing shall be analyzed in deep. Some of the analytical model of the evacuation simulation will be improved through the analyses of the route map.

(3) The tsunami evacuation simulation using the improved modeling and scenario should be implemented and the results should be compared with the data. This process will give us more knowledge about the mass evacuation of the April 11, and support us to raise more clear conclusions and recommendations.