

30 Minutes in the City of Padang: Lessons for Tsunami Preparedness and Early Warning from the Earthquake on September 30, 2009



Working Document No. 25

Case Study

Updated edition, May 2010

30 Minutes in the City of Padang:
Lessons for Tsunami Preparedness and Early Warning
from the Earthquake on September 30, 2009

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Updated edition

May
2010

2010

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Cover photos

Pictures of destruction in Padang City and a photo from Diskominfo (2009) that shows the panic immediately after the earthquake. All pictures were displayed at the Emergency Coordination Post of the Mayor's Office

Correction in updated edition (May)

The reason Padang's local radio station *ProNews* could not go on air for three days after the earthquake was a lack of power supply. Their communication and broadcasting equipment was not damaged.

ACKNOWLEDGEMENTS

The authors would like to thank all the people of Padang who were ready to answer questions and to share their stories about the earthquake and its aftermaths. We would like to express our thanks to the colleagues from KOGAMI (Tsunami Alert Community) who helped to train enumerators and conduct the field survey. Padang's Municipal Disaster Management Agency (BPBD) supported the study and took care of the official requirements, for this we would like to express our gratitude. The colleagues from TPSPB (Team for the Development of a Disaster Management System for Padang) were of vital importance in discussing the study's findings and in addressing the recommendations to the authorities. We would like to express our appreciation to them. Neysa Jacqueline Setiadi (UNU-Last Mile) provided significant support for the analysis of the survey data – thank you, Neysa. Thanks also to Niklas Gebert (UNU-EHS-GITEWS) who joined the discussion on 'how to look at' the survey findings. Our colleagues, Harald Spahn (Team Leader, GTZ IS-GITEWS) and Willy Wicaksono (Local Advisor for Padang, GTZ IS-GITEWS) provided constructive comments on draft versions of the paper – thanks to both of you. Last but not least, a special thank goes to Karrie McLaughlin for providing very helpful comments on the final draft of the paper.

We would like to express their sympathy for those who died in the earthquake as well as to their families.

EXECUTIVE SUMMARY

The earthquake in West Sumatra on 30 September 2009 killed more than 1,000 people and injured many more. Fortunately, the earthquake did not cause a destructive tsunami. The National Tsunami Warning Centre (NTWC) in Jakarta had only issued earthquake information but no tsunami warning. However, the strong tremor caused widespread panic and fear of a tsunami among the people of Padang.

About six weeks after the earthquake, GTZ IS-GITEWS conducted field research in Padang to find out what had happened after the earthquake. The study focussed on the first 30 minutes after the tremor: the estimated arrival time at coast of tsunami waves originating from a nearby source after a major earthquake (worst case scenario). How did the people of Padang react after the earthquake had ended? Did they have access to official information on the earthquake early on? What did local authorities and disaster management agencies do to quickly get information to the public? These are the questions discussed in the paper “30 Minutes in the City of Padang: Lessons for Tsunami Preparedness and Early Warning from the Earthquake on September 30, 2009”.

The study used a combination of quantitative and qualitative research methods. Enumerators interviewed 200 individuals. A field researcher conducted informal interviews with community members and key actors from disaster agencies and related institutions. KOGAMI (Tsunami Alert Community), a local NGO in Padang and the Municipal Disaster Management Agency (BPBD) supported the field research. The UNU-Last Mile Evacuation research project supported data analysis.

A seminar at the end of January 2010, hosted by BPBD and support by GTZ IS-GITEWS discussed the findings of the study and addressed its recommendations to high-level representatives of the city government. The results were integrated into the local regulation (Mayor’s Decree) on Tsunami Early Warning in Padang that was approved in April 2010.

Findings and conclusions with regards to community reaction and access to information:

Half of the people interviewed in the survey evacuated low-lying coastal areas in relatively short time (15 minutes after the tremor 83% of them had left). The trigger for evacuation was the strong earthquake. However, in the absence of other (official) information many people went to the beach to see whether the water was retreating. As this was not the case most of them decided not to evacuate. The time it takes from the moment when the water begins to retreat to the arrival of the first wave is only a few minutes. People will not have enough time to escape.

Official information was largely absent in the first 30 minutes after the earthquake. The vast majority of the people did not receive any official information on whether there was a tsunami threat or not. Information mainly spread by word of mouth and was based on rumours. Over time the news that there was no tsunami threat and people could return home, aired on RRI (*Radio Republik Indonesia*) and announced by the Mayor, gradually found its way to more and more people. The use of FM Radio frequencies to get the information to the people is an appropriate choice. However, since estimated tsunami wave arrival times for Padang are very short, information that is available only 1 hour after the tremor will come too late.

The evacuation process was snarled by massive traffic congestion. People mainly escaped on motorbikes and in cars. There was massive traffic congestion. Many accidents

occurred. The designated evacuation routes were not sufficient to channel the masses. People, apparently, do not consider vertical evacuation an option. Evacuation proceeded only as a horizontal movement away from the coast and direction inland. The fact that people were headed towards the sea created even more chaos.

There is a lack of understanding of the warning system but people trust the government to provide them with accurate information directly after an earthquake. Most interviewees have only a vague idea of how the tsunami warning system as a whole operates. From their perspective the most important thing is that they get accurate and official information quickly. People trust their local government, especially the Mayor. They believe that the government would provide them with accurate information directly after an earthquake.

Findings and conclusions with regards to information dissemination by the authorities:

The information from BMKG reached the authorities in Padang within 5 minutes of the earthquake. Padang's Operations Control Centre quickly received the information from BMKG (National Agency for Meteorology, Climatology and Geophysics) via Internet. The earthquake left several cellular telephone operators unable to function. Therefore SMS does by no means qualify as a single source of information and warnings from BMKG.

The authorities disseminated information and guidance to the general public only about 30 minutes after the earthquake. There was no communication between the Mayor and the Operations Control Centre. On the day, these two actors operated alone. The Mayor could not receive information from BMKG via text message. The Operations Control Centre could only communicate information via communication radio but not to a wider public. The information from BMKG had reached Padang authorities about 5 minutes after the earthquake but was only available to the public about 20 to 25 minutes later, when the Mayor had received information and announced it on RRI. Again, when comparing tsunami arrival times and the time it needed to get the information to the people it has to be concluded that the information came too late.

Other government and non-government disaster organisations quickly received information from the Operations Control Centre via radio communication networks. The fact that certain VHF channels are assigned as emergency frequencies enabled quick information dissemination amongst institutions. The institutions could then forward the information on their individual frequencies. However, only very few institutions provided the information that there is no tsunami threat to the public.

Local FM radio brought official information to the public. RRI Padang was able to go on air about 15 minutes after the earthquake. However, they had not received information from BMKG yet. Both, *ProNews FM* and *Classy FM*, received the information from BMKG via VHF or retrieved it from the BMKG website early on but their stations were down – either because of a lack of power back up (*ProNews*) or problems with broadcasting equipment (*Classy FM*).

Recommendations:

Increase community awareness with regards to natural warning signs and reaction.

Local stakeholders in Padang already agreed on an appropriate evacuation scheme that relies on (1) strong ground shaking as the first trigger for immediate evacuation and (2) the information from BMKG and/or the local authorities that reinforces this reaction or cancels evacuation. This strategy needs to be officially recognized and widely promoted. Outreach activities need to communicate the strategy to the community and explain that relying on the natural warning sign of retreating seawater, as an indication of an impending tsunami is not an option for the City of Padang.

Increase people's awareness with regards to the warning system and how it can serve them.

People need to have a basic understanding of how InaTEWS, the Indonesian Tsunami Early Warning System and the warning chain works. Outreach activities at grass root level as well as media campaigns have to pass this knowledge on to the people. These activities also need to make sure that people know the sources of the information and the kind of guidance that they can receive after an earthquake. Organisations such as the local NGO KOGAMI and the Indonesian Red Cross play a vital role in community outreach. However, their outreach material needs to be reviewed and adjusted to the agreed evacuation scheme.

Provide Padang's Operations Control Centre with the authority and mandate for decision-making and direct dissemination of public guidance.

The local Operations Control Centre in Padang received the information from BMKG within minutes of the earthquake. Therefore the Operations Centre should be granted the authority to make the decision on whether the people of Padang need to evacuate or not and to disseminate guidance to the public immediately without prior approval by the Mayor. This follows the logic of decision-making Standard Operating Procedures (SOP) that translate standardized warning from the NTWC into standard reaction at the local level. The study results show that people trust the information from the government after an earthquake, especially the direct guidance from the Mayor. It should be part of the SOP that the Operations Centre and the Mayor establish contact via radio frequencies directly after an earthquake has ended. If in case of emergency this communication can be established before the information from BMKG comes in the Mayor can be directly involved in the decision making process and disseminate guidance himself. If not, the Operations Centre will directly disseminate public guidance. This authority of the Operations Centre needs to be communicated and explained to the public.

Provide Padang's Operations Control Centre with sufficient human, financial and technical resources to do their job.

The importance of the Municipal Disaster Management Agency (BPBD) and the Operations Centre as one of the agency's units in tsunami preparedness and early warning needs to be fully recognized in local policies. The local regulation on Tsunami Early Warning is a first important step. The budget requirements of BPBD and the Operations Centre also need to be integrated into local planning and budgeting. Only with full government support with regards to human and technical resources BPBD and the Operations Centre will be able to perform their duty.

Extend the scope of the public warning dissemination system in Padang.

The study shows that official information reached very few people within the first 30 minutes after the earthquake. Radio communication (via VHF and FM) has proven to be a very reliable solution for information dissemination. It is recommended to significantly extend the warning dissemination system via mosque loudspeakers and FM channels and to revisit the agreement on a local FM radio frequency as a source of official information. The

promotion of the use of FM radios by the public as a source of information for the public is crucial.

Create multiple links to BMKG. The use of multiple communication channels to receive information from BMKG is critical. In order to avoid information bottlenecks several local (government as well as non government) institutions need a direct link to the NTWC at BMKG. Local radio stations can get the information directly from BMKG and forward it to the public and/or receive information from local authorities via radio communication.

Provide sufficient evacuation infrastructure and promote clear procedures. Shortly after the earthquake in Padang the roads were blocked with vehicles, which made evacuation almost impossible. Plans for the construction of vertical evacuation shelters in the red zone are available in Padang but need to be implemented urgently. The evacuation plan for the City of Padang needs to be reviewed based on the official tsunami hazard map (approved in April 2010) and the evacuation infrastructure. The plan needs to be officially approved, widely distributed among government and non-government institutions and communicated to the public. The official evacuation plan (and map) for the city can then serve as a reference for evacuation-planning activities at neighbourhood level.

1. INTRODUCTION

When the ground shook on that late Wednesday afternoon at about 5:16, people in Padang knew this earthquake was stronger than any other tremor they had experienced before. The shaking lasted for more than a minute. Many buildings collapsed immediately, burying hundreds who could not find their way out. Not able to stand, those already outside got down on the ground and waited for the shaking to come to an end. Power was out almost immediately, followed by the failure of cellular networks when people tried to reach their relatives and friends. Within a minute Padang descended into chaos.

After the shaking had stopped, the streets of Padang filled with people in shock and panic. Many immediately took their motorbikes or cars, or hurried through the streets on foot to look for their families. At the same time there was another thought: the fear that the earthquake had caused a tsunami that would already be heading towards the coast.

The gruesome event of September 30, 2009, killed more than 1.000 people in West-Sumatra. People died in buildings, were hit by falling objects or became victims of landslides. As we now know, no destructive tsunami was triggered. However, the intensity of the quake and institutional and community reaction to it provides us with an opportunity to learn about tsunami preparedness and early warning in Padang. How did people in Padang react after the tremor was over? Did they evacuate? Did they have access to information from authorities early on? What did local authorities and disaster management organizations do to get guidance to the public as quickly as possible and the situation under control? This study attempts to answer these questions. It is based on research conducted by GTZ IS-GITEWS in cooperation with KOGAMI and support from BPBD and the UNU-Last Mile Evacuation project about six weeks after the event at the beginning of November 2009.

Appropriate community reaction to an imminent tsunami threat is a matter of awareness of the hazard, understanding of evacuation procedures, capability to evacuate and efficiency of and knowledge about the local warning system. In West Sumatra, and especially in the populous city of Padang, where estimated wave arrival times of local tsunami waves are short, immediate reaction to ground shaking is key to saving lives. A subsequent information – or warning – from the NTWC has to be translated quickly and accurately into guidance by local authorities and widely disseminated to the public. This information from the Indonesian Tsunami Early Warning System (InaTEWS) provides more clarity on the situation. It reinforces evacuation or cancels an ongoing evacuation if there is no tsunami threat, and thereby helps to prevent unnecessary panic.

There remains an earthquake and tsunami threat for West Sumatra and the city of Padang. Despite its size, the recent earthquake did not rupture the Sunda mega thrust and did not significantly relax the 200 years of accumulated stress on the Mentawai segment (see McClosky et al, 2010¹). Though time and size cannot be predicted on the dot, another even bigger quake is very likely to happen. This study, its conclusions and recommendations aim to contribute to preparation for future events and better tsunami preparedness in Padang.

The paper proceeds as follows. Chapter 2 provides an overview of the study's methodology. The perspective of the NTWC on the event is described in Chapter 3.

¹ McClosky, J, Lange, D., Tilman, F., Nalbant, S. S., Bell, A.F., Hilman, D., Rietbrock, A.: The September 2009 Padang earthquake, *Nature Geoscience* – Advance Online Publication available at: www.nature.com/naturegeoscience, 2010

Chapter 4 discusses the main findings looking at both the reaction of Padang's community as well as government institutions in charge of early warning. Chapter 5 concludes and provides recommendations for the authorities in Padang as well as civil society actors involved in tsunami preparedness and early warning.

2. METHODOLOGY AND OBJECTIVE

Following the UN-ISDR framework² for early warning, the study looked at the elements of warning dissemination and response capability. It assessed tsunami preparedness at community level and institutional capacities with regards to early warning and information dissemination at government level. Based on the analysis of what happened right after the earthquake in Padang on 30 September 2009, the study provides informed recommendations for improved tsunami preparedness and early warning to the municipal authorities and other stakeholders. A seminar in Padang at the end of January 2010, hosted by BPBD presented and discussed the main findings and recommendations to local stakeholders, including high-level government representatives.

The research focused on community and government reaction in Padang within 30 minutes of the tremor. This half hour represents the time from the moment of an earthquake to an estimated arrival of a first tsunami wave at the coast of Padang (i.e. the worst-case scenario for tsunami wave arrival times by Borrero et al³).

The study used a combination of quantitative and qualitative research methods. Using a standardized questionnaire 20 enumerators interviewed 200 individuals in the “red zone” (see figure 1) in the city of Padang who had been in that zone during the earthquake. The survey was conducted from 7-8 November 2009. The sample was drawn from a pool of respondents who participated in a UNU-Last Mile⁴ survey conducted in 2009 which covered 1200 households. The UNU survey looked at intended reaction after an earthquake, among other things. The criteria for respondent selection was geographic distribution across the red zone and variation in their answers with regards to an intended reaction after a strong earthquake and to the tsunami threat.

The questionnaire looked at the following issues:

- People’s perception of the earthquake’s intensity,
- Their reaction during and their reaction after the earthquake had ended, and
- Their access to official information about tsunami potential and evacuation.

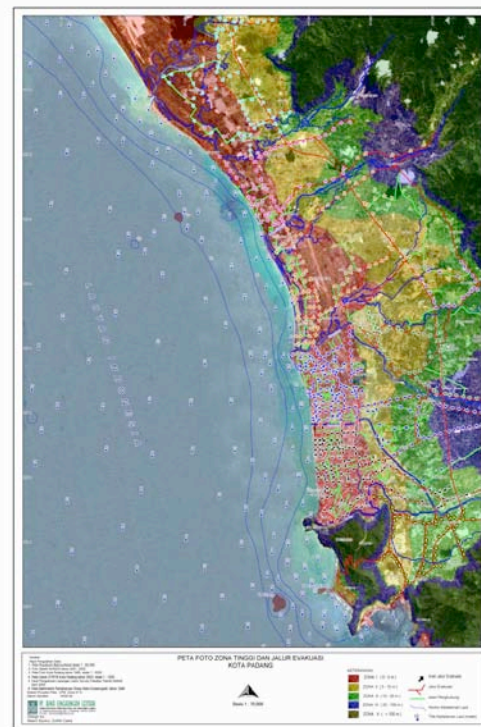


Figure 1: 1st generation tsunami hazard map of Padang (source: KOGAMI)

² UNISDR: Developing Early Warning Systems – A Checklist. An output of the Third International Conference on Early Warning (EWC III) held in Bonn, Germany from 27-29 March 2006.

³ Borrero, J. C., Sieh, K., Chlieh, M., and Synolakis, C. E.: Tsunami inundation modeling for western Sumatra, P. Natl. Acad. Sci. USA, available at: www.pnas.org, 2006.

⁴ United Nations University - Environmental and Human Security (UNU-EHS) – Last Mile Evacuation, working package on socio economic vulnerability; Taubenböck, H.: “Last-Mile” preparation for a potential disaster – Interdisciplinary approach towards tsunami early warning and an evacuation information system for the coastal city of Padang, Indonesia, Nat. Hazards Earth Syst. Sci., 9, 2009

In order to get a deeper understanding about community reaction and overall preparedness the quantitative work was supplemented by semi-structured interviews. A field researcher interviewed 20 residents who live in the red zone. These respondents were not part of the sample of the survey. Additionally, one Focus Group Discussion (FGD) was conducted. The interviews that took place from 7-14 November 2009 focussed on the following issues:

- People's knowledge and awareness of tsunami hazard and the warning system,
- Access to official information from local authorities after the earthquake, and
- Their reaction to the earthquake and the overall conditions at the time.

To understand what happened on the part of local authorities, in and amongst disaster management agencies that are in charge of providing timely information to the public, the study conducted semi-structured interviews with 14 key actors from several government and non-government institutions in Padang. The following topics were assessed:

- Overall conditions at the time immediately after the earthquake,
- Receipt of information from BMKG that operates the NTWC,
- Communication and coordination among government institutions,
- Decision making procedures and mandates, and
- Dissemination of information and guidance to the public.

3. THE EARTHQUAKE FROM THE PERSPECTIVE OF BMKG

The NTWC at BMKG issued earthquake information via SMS and their website slightly more than 4 minutes after the earthquake (BMKG 2009⁵). According to BMKG, TV One, an Indonesian TV station, broadcasted the earthquake information at about 5:25 pm in their evening news.

Despite the large magnitude of the earthquake (initially measured at 7.6 on Richter scale and later revised to 7.9) and its location in the sea, no tsunami warning was issued. The evaluation of the earthquake by BMKG concluded that due to its depth (71 km) the earthquake had no potential to cause a destructive tsunami.

The earthquake information short message that was sent out by BMKG had the following content:

Info Gempa [earthquake information] *Mag* [magnitude]: 7.6 SR [Richter Scale], 30-Sep-09, 17:16:09 WIB [Western Indonesian Time], *Lok* [location]: 0.84 LS-99.65 BT [geographic coordinates] (57 km Barat Daya [southwest of] PARIAMAN-SUMBAR), *Kdlmn* [depth]: 71 km ::: BMKG

The BMKG website provided the same information. Additionally, it indicated that the earthquake had no tsunami potential.



Figure 2: Location of epicenter (GFZ 2009)

Time (WIB)	Time Interval (minute)	Time Line of Padang earthquake – West Sumatra September 30, 2009
17:16:09		Earthquake occurred
17:16:25	0:00:16	Live signal and the status of the station were blinking (PDSI, PPI, SDSI, BKNI)
17:16:40	0:00:40	Information received that earthquake was felt in Jakarta IV MMI, Bandung II-III MMI, Tangerang II-III MMI
17:16:50	0:00:40	Start Interactive Tool using Seiscomp3
17:17:36	0:01:26	Result of the first location Seiscomp3: OT= 17:16:04 WIB, 0.76 Lat (N) – 99.20 Long (E) Mag = 7.3 SR Depth:26 km, were followed by alarm sound
17:18:30	0:02:20	Interactive update by Seiscomp3: OT= 17:16:09 WIB, 0.84 Lat (N) – 99.65 Long (E), Mag= 7.6 SR, Depth = 71 km
17:19:15	0:02:32	Commit seiscomp3: OT= 17:16:09 WIB, 0.84 Lat (N) – 99.65 Long (E), Mag= 7.6 SR, Depth = 71 km
17:19:33	0:02:50	Seismic decision OT= 17:16:09 WIB, 0.84 Lat (N) – 99.65 Long (E), Mag= 7.6 SR, Depth = 71 km
17:19:55	0:03:12	Export data for dissemination
17:20:30	0:03:47	Final seismic decision
17:20:41	0:03:58	Decision for dissemination: OT= 17:16:09 WIB, 0.84 Lat (N) – 99.65 Long (E), Mag= 7.6 SR, Depth = 71 km
17:20:57	0:04:14	Checking log status, it has been sent or received
17:25:50	0:09:07	Earthquake information on TV ONE (Kabar Petang)

Figure 3: BMKG timeline of the event (BMKG 2009)

⁵ Earthquake report by BMKG, 2009

4. 30 MINUTES IN THE CITY OF PADANG

4.1 When the ground shook...

It was a Wednesday at the end of September 2009, late afternoon, about an hour before evening prayers. At 5:16 pm local time most of the population of Padang were on their way home. The roads were full of private and public vehicles taking people home to their families.⁶

But there was something different about that Wednesday – a day that the people of Padang and West Sumatra will remember for the rest of their lives. A strong earthquake struck this city in the land of *Minangkabau*; an earthquake many locals said was the worst in living memory.

When the earthquake hit, there was a noise like a very strong wind. At the same time, we felt as if we were being thrown upwards. The ground was moving like waves. We couldn't even stand up, so as soon as we were outside, we all just lay face down. We could hear the sound of falling glass breaking and buildings collapsing. That's how we knew that this was a massive earthquake.⁷

The earthquake was very big, *Pak*⁸. The shaking was strong. I was very scared because I had never experienced something like this. [...] We could not stand up. The shaking made people fall over. There was nobody who was not scared by the earthquake...it was horrifying. We could see the electricity poles swinging. We were really afraid.⁹

When the earthquake hit, those who were inside tried to get out of and away from the buildings they were in, be they houses, offices, hotels or shopping centres. Getting out was considered the best option, rather than taking the risk of being hit by falling debris from the buildings. People who were outside on the street fell over or had to get down on the ground.¹⁰

I was very scared at that time because the earthquake was so strong. After I got out I could not stand up. So we had to sit or lay down on the street. The asphalt looked like a piece of cloth that is swaying [in the wind]. Those on motorbikes fell over.¹¹

Spontaneously I left the house. But before that, I went to get my children who had been sleeping. I took them out as well. My wife also ran out. We were all safe but our house was broken in some parts.¹²

The earthquake lasted about a minute, starting with a smaller tremor for a few seconds and ending in a massive tremor¹³ that ultimately destroyed many buildings in the city of Padang and killed more than 1,000 people in West Sumatra.

⁶ Transcript Warga biasa_05

⁷ Transcript Aktor Kunci_07

⁸ *Pak* is the Indonesian form of address to an older man, equivalent to Sir

⁹ Transcript Warga biasa_01_FGD

¹⁰ For reactions during the earthquake, see the interview transcripts which record the reactions of each of the respondents.

¹¹ Transcript Warga biasa_12

¹² Transcript Warga biasa_03

¹³ Transcript Aktor Kunci_03 and transcript Aktor Kunci_04

Most people in Padang have experienced several earthquakes in the past, ranging in magnitude from small earthquakes to the large one on 30 September 2009. But according to the local people, this latest quake was the strongest and biggest they had ever felt.

Many people were convinced that the magnitude of this earthquake was more than 8 on the Richter scale. Based on their first-hand experience with the intensity of previous earthquakes, they draw their own conclusions about the magnitude of this one.

The earthquake was huge. Maybe 9 on the Richter scale. We were told it was 7.6¹⁴. The government did that deliberately so that people wouldn't panic.¹⁵

...the one in 2007 was 7.9 and the damage was nothing like this. And that earthquake [in 2007] was nothing like as big as the one on 30 September. It was probably more than 8, might even have been 9.¹⁶

4.2 After the earthquake was over: reactions by the people in Padang

Could there be a tsunami?

Being well aware of the tsunami threat along their coast and due to the strengths of the earthquake that had just happened, most people in Padang thought that there could be a tsunami (see figure 4).

[Q in FGD:] When the earthquake was over, did you think there could be tsunami?

[Resp. A:] Yes, I had thoughts like this, *Pak*, because the earthquake that had happened was so strong. And with such a big earthquake it is very possible that a tsunami occurs.

[Resp. B:] I immediately thought that a tsunami could happen. The earthquake was very strong.

[Resp. C:] Already after the earthquake in 2007 [that was less strongly felt in Padang] many people thought there could be tsunami. Even more for the earthquake we experienced lately. People definitely thought there could be a tsunami.¹⁷

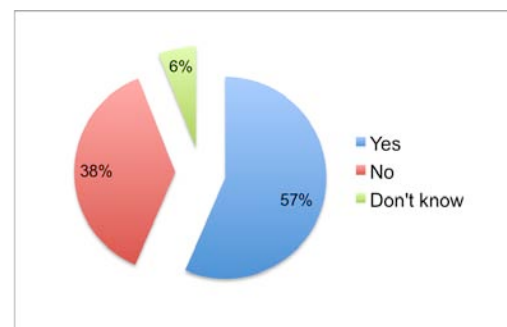


Figure 4. People's perceptions of the likelihood of a tsunami occurring (based on the earthquake's intensity; n=200)

The tragedy of Aceh, the reports about the earthquake and the tsunami on 26 December 2004, made many people in Padang – and all over Indonesia – aware about tsunamis and how they occur. These pictures and stories from Aceh emerged again in some people's minds on 30 September 2009.

[...] I was afraid. I am traumatized by the events in Aceh, *Pak*. As I saw on television at that time...there were a lot of victims. Moreover, my house is directly at the seashore.¹⁸

Yes, surely afraid, *Pak*, with such a big earthquake my only imagination was "tsunami". We survived the earthquake, ok, but the tsunami? That's not certain. Like in Aceh, many people survived the earthquake but when the tsunami came a lot of people became

¹⁴ Initial magnitude published by BMKG. The magnitude was later corrected to 7.9 on Richter scale.

¹⁵ Transcript Warga biasa_10

¹⁶ Transcript Warga biasa_09

¹⁷ Transcript Warga Biasa_01_FGD

¹⁸ Transcript Warga Biasa_13

victims. So what is frightening is not the earthquake, but the tsunami. We are already used to earthquakes...it is our daily diet', as we say. But the tsunami scares us.¹⁹

My wife shouted...she said there would be a tsunami. She pulled me and asked me to leave. Our neighbours also said there will be a tsunami because the earthquake was so strong. Gosh, this made my thoughts go in the same direction. I remembered the Aceh case that I saw on television – wasn't that serious, *Pak?! It scared me. After my wife had prepared our things, we left to a relative's house on higher ground.*²⁰

Many people in Padang reacted like that. However, not all chose to leave the low-lying coastal area immediately. After the tsunami in Aceh, people had learned that there are natural warning signs of an impending tsunami. Besides a strong earthquake, a sudden low tide would indicate that tsunami waves are approaching. Scared and uncertain whether a tsunami is on its way, many people now looked for this indication – or 'proof' – that the waves are coming.

Is the seawater retreating?

After the earthquake subsided, many people either stayed at the beach near their house or rushed to the beach to check what the sea was doing.

[Q:] Why did you watch the sea?

If the tide's a long way out, that's a sign that there's going to be a tsunami. But at that time, the sea was quite calm, calmer than it is today. There were no waves at all. And that's how I knew that there wasn't going to be a tsunami.

[Q:] Were you sure that there could not be a tsunami?

I was very sure...and not only me, others too. There were a lot of other people who were also looking at the beach...they were also sure that there could not be a tsunami. At that time it was very crowded here at the beach. Everybody watched the sea. People from up there [further inland] also came down to look at the sea.²¹

After the earthquake had ended, I directly went to see the condition at the beach. Not only me, I saw that the people along the coast also did the same thing. I watched the sea for 5 minutes after the earthquake but the seawater was calm. If at that time the sea had retreated I would have immediately left. But apparently nothing happened. That made me calm. I called my wife using *Flexi*²². My family was alright. I told her that I am at the beach. I also told her to prepare our things and that in case I see the seawater retreating we would leave quickly. I stayed at the shore for about 10 minutes and the seawater was just calm. That is why I was sure that no tsunami would come. [...] But I also saw people in panic. They did not care whether the seawater retreated or not they just wanted to save themselves. Maybe the events in Aceh had traumatized them. They had also traumatized me. That's why: my criterion [to know whether there will be a tsunami] is the [condition of the] seawater. But it turned out there was nothing.²³

¹⁹ Transcript Warga Biasa_18

²⁰ Transcript Warga Biasa_19

²¹ Transcript Warga Biasa_07

²² *Flexi* is one of the cellular phone network providers that still operated after the earthquake. The other provider still operating was *XL* while *Telkomsel* (a provider that is very commonly used) was done.

²³ Transcript Warga Biasa_15

The fact that the seawater did not retreat was the main reason why many people did not evacuate (38.9% of those who did not evacuate, see figure 5). In the uncertain situation after the earthquake many people relied on this natural warning sign of tsunamis as source for more information. Either they went to check on the condition of the sea themselves or got information from others.

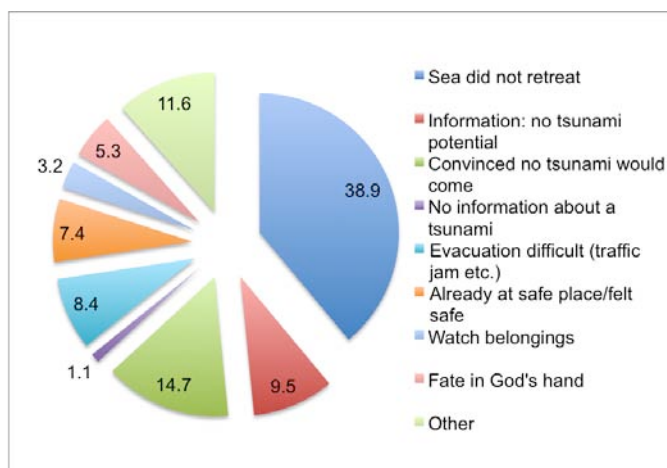


Figure 5: Reasons not to evacuate (n=102 respondents)

Many people heard about what the people who had gone down to the beach had seen. While some people felt relieved about the news, not everyone was convinced by what people had observed at the sea. Some respondents still chose to evacuate. The fact that the sea had not retreated was no guarantee for them that there would not be a tsunami.

After my husband had been down at the beach for 10 minutes, he came back and took us to a relative's house on higher ground. My husband said that the tide hadn't gone out, and that the surface of the sea was calm. There were no waves at all. My husband said it would be better to evacuate than to be caught out by a tsunami. We were all so scared.²⁴

A lot of people here went directly to the beach to see the sea. They said the seawater was not retreating. So maybe it was safe and there would not be a tsunami. But, whatever, I was already so afraid. Better I ran rather than something happens. We did not know whether a tsunami would come or not, did we?! The most important thing was that my husband and I were safe.²⁵

There are several other reasons that the respondents who did not evacuate at any time after the earthquake mentioned (see figure 5). Some people said that evacuation would be too difficult because of the heavy traffic congestion while others were simply convinced that there would be no tsunami (14.7%). Only 9.5% of those who evacuated said that they had received information that there was no potential of a tsunami.

No time to waste: let's evacuate!

The results of the qualitative interviews indicate that the majority of the people in Padang evacuated. Most of the 20 interviewees said that they had left to higher ground and further inland almost immediately and saw many other people leaving. The survey results, however, provide a different picture. Looking at the figures from the survey, only about

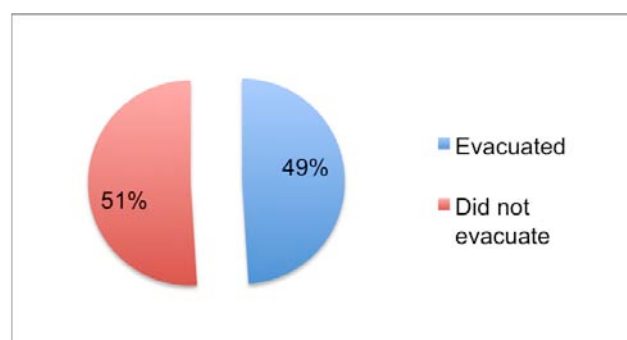


Figure 6: Percentage of respondents who evacuated / did not evacuate after the earthquake (n=200)

²⁴ Transcript Warga Biasa_21

²⁵ Transcript Warga Biasa_13

half of the 200 respondents chose to evacuate their houses and head for higher ground (see figure 6).

Still, there was panic due to severe traffic conditions, uncertainty and fear everywhere, exacerbated by the information from sources unknown, spread by word of mouth, that there might be a tsunami after such a huge earthquake. Many people were influenced by the panic of others and also decided to leave. Most of those people who left their houses and evacuated (98 out of 200 respondents) did this in a relatively short time after the earthquake.

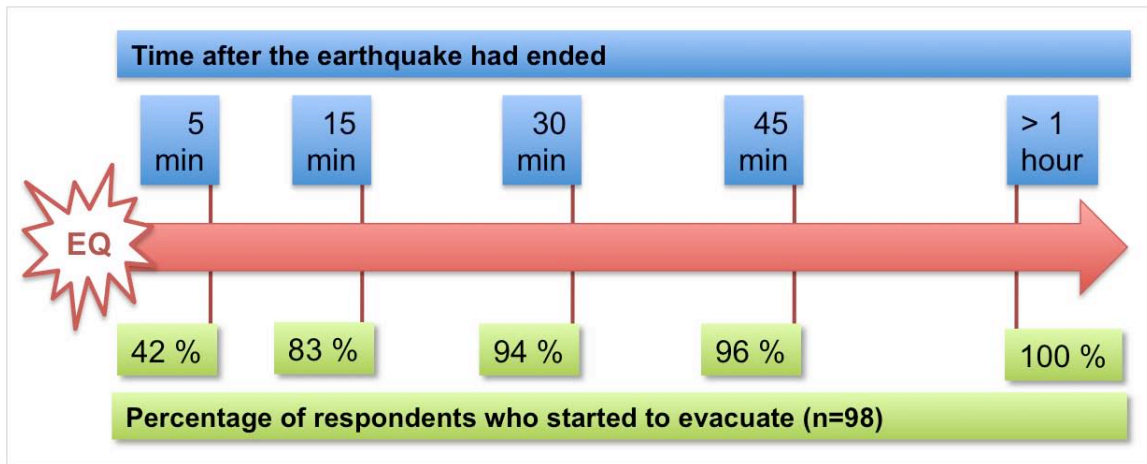


Figure 7: Timeline showing the time after the earthquake that it took the respondents who did evacuate (n=98) to start moving

42% of the 98 respondents that chose to evacuate did so immediately, within 5 minutes of the earthquake. After 15 minutes 83% were on their way.

Prior to evacuating, they gathered their family members together, going out to collect children who were out or at school. People organised valuables and other things to take with them. When all the family members had assembled they eventually left.

After I was sure that the earthquake was over I went back into the house quickly. I checked the condition inside. Many things had fallen down. [...] With the help of my wife, I collected some valuables, including money, important papers and other valuables. I pushed out the motorbike that was in the house. Then, not even 10 minutes later I was already on my way with the motorbike.²⁶

About 10 minutes after the earthquake my wife and me were already on our way. We had to be that quick actually, the tsunami comes quickly, doesn't it?! The tsunami could come very quickly, it could take only 30 minutes. We were racing against time. Instead of dying like a fool, sitting and waiting at home, it is better to run.²⁷

Maybe around 5 minutes later [after the earthquake], I first gathered my family, and then I took some cloths, important papers, and money. After everything was ready, I locked the door of my house. I was afraid there could be thieves. Then we left.²⁸

²⁶ Transcript Warga Biasa_18

²⁷ Transcript Warga Biasa_16

²⁸ Transcript Warga Biasa_10

At that time, I immediately searched for my child, I was afraid a falling wall had hit her. But, *Alhamdulillah*²⁹, I found her and she was alright. Only her leg was scratched because she had fallen. I brought her home to my wife. Then I went into the house again and checked on the destruction while gathering some valuables. But not long after that I saw a lot of my neighbours in panic. They were all busy gathering their families and getting ready to go. This made me panic too. My wife finally convinced me to also leave. They said we need to go to the bypass road³⁰ where it is safe.³¹

Traffic jam everywhere

Most fled using whatever vehicles they had available, while some chose to walk as quickly as they could (see figure 8). People knew that a tsunami would only need a very short time to the coast after a major earthquake.

At least half of the population of the coastal areas of Padang was on the move. Every road heading to higher ground and away from the coast was blocked with people and vehicles. Crossroads were jammed with traffic, making people panic even more. People could not use the designated evacuation routes. Instead, they tried to find shortcuts that might avoid the traffic.³² The worse the traffic jams got, the more people tried to find alternative routes to safety. Some car owners abandoned their vehicles when they realised that the traffic jams were so bad they would not be able to go anywhere. There were accidents as people drove without regard for traffic rules. The fact that people were on their way to the beach to see whether there are signs of a tsunami while others were leaving in the opposite direction made the chaos even worse.³³

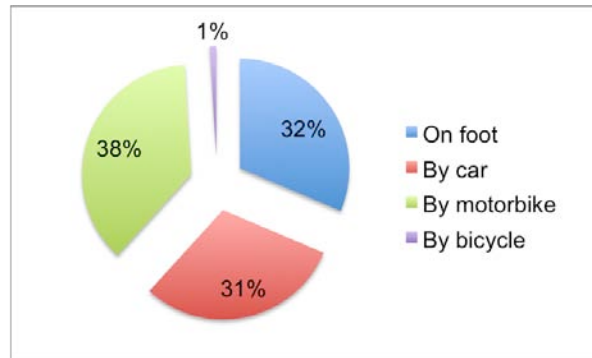


Figure 8: Means of transport for evacuation (n=98)

About ten minutes after the earthquake, I set off for the bypass with my wife and children. But the roads were completely blocked, and there were no police directing the traffic. I tried to find another way out, but it was impossible. Finally we arrived at the bypass road at 7 pm.³⁴

All the roads were blocked. Those of us near the beach wanted to get to higher ground. And those on higher ground wanted to get to the beach to see what the sea was doing. So the traffic was complete chaos.³⁵

²⁹ Praise be to God

³⁰ The distance from the coast to the bypass road of Padang is about 5-6 km.

³¹ Transcript Warga Biasa_08

³² Transcript Warga Biasa_21

³³ None of the interviewees mentioned vertical evacuation to higher building as an option for evacuation. The evacuation process was a horizontal movement away from the coast.

³⁴ Transcript Warga Biasa_08

³⁵ Transcript Warga Biasa_09

4.3 Access to official information

Almost no access to official information in the first 30 minutes

In the chaos after the earthquake many people's only thought was to get away as quickly as possible. With the power supply out after the earthquake and most cellular phone networks down, many people were unable to get official information about the likelihood of a tsunami occurring after the earthquake. The information that was available was therefore unclear and mostly based on rumour, which then spread.

[Q:] Wasn't there someone else who provided you with information, *Ibu*³⁶?

No, there wasn't anyone... who? [respondent looked confused] After the earthquake, what I saw was only people who were scared and in panic. Some of them had the same thoughts like me, maybe this earthquake has caused a tsunami. But some who had already seen the sea said there is no tsunami...this confused me, what can I trust in? [...] Nothing was certain, so I just ran.

[Q:] Who do you trust to give you information [in such a situation], *Ibu*?

Well, actually, the government has to announce whether there is a tsunami or not. Who trusts information that comes from normal people [*orang biasa*], like me?³⁷

No, there was none [no information]. Where should the information come from? The power supply was out. Cell phones could also not be used. Well, one felt just like someone in the middle of the forest. Also, everybody was in panic and nobody thought about searching for information. For me, watching the sea [that did not retreat] was enough, it was safe.³⁸

However, some few respondents said that they heard information from the official government radio station *Radio Republik Indonesia* in Padang (RRI Padang). They heard the news on their car radios or on transistor radios.

I heard on the radio, if I am not mistaken it was RRI. At that time the Mayor of Padang was talking about the earthquake. We were advised to return to our homes because there was no tsunami. The owner of the house [to which I had evacuated] had switched on the radio. This announcement calmed me down and relieved me a bit. At about 9 pm we returned to our house.³⁹

I heard the Mayor speaking on the radio but that was already 1 hour after the earthquake. Actually, I listened to the radio in my taxi. He said that everybody has to stay calm and should not panic because there was no tsunami.⁴⁰

[Q:] Did you know whether there was or was not a potential for a tsunami?

I knew that there was no tsunami. [...] I heard on my car radio that the earthquake that had happened did not cause a tsunami. It was broadcasted on RRI and the Mayor was speaking. He said that the people should not panic. There is no tsunami in Padang and the people are asked to return home.

[Q:] How long after the earthquake did you get this information?

Maybe around 30 minutes after the earthquake...I forgot. It was not all that long after the earthquake.⁴¹

³⁶ *Ibu* is the Indonesian form of address to an older man, equivalent to Madam

³⁷ Transcript Warga Biasa_13

³⁸ Transcript Warga Biasa_20

³⁹ Transcript Warga Biasa_08

⁴⁰ Transcript Warga Biasa_02

Over time more and more people received the information from RRI, either directly or by word of mouth. However, within the first 30 minutes of the earthquake only very few people received official information. The vast majority did not receive nor pro-actively search for official information from local authorities. Due to power outage, the use of television sets to get information from BMKG was also not an option. The table below (see figure 9) provides some findings from the survey on how people received information related to the earthquake within the first 30 minutes. Only 35 respondents (out of 200) received information on the earthquake that can be related to official information sources (i.e. based on information from local authorities and BMKG).

Information Content	Information Channel	Number of respondents who received information:		Total
		0-15 min after the EQ	15-30 min after the EQ	
No tsunami potential from the earthquake <i>(Gempa tidak berpotensi tsunami)</i>	Radio	3	-	
	TV	-	-	
	SMS	-	-	
	Phone	1	-	
	Loudspeaker	2	1	
	Patrol car	-	1	
	By word of mouth	6	2	
	Total	12	4	
Earthquake parameters <i>(magnitude, location etc.)</i>	Radio	-	-	
	TV	-	-	
	SMS	-	-	
	Phone	1	1	
	Loudspeaker	-	-	
	Patrol car	-	-	
	By word of mouth	3	1	
	Total	4	2	
There is no tsunami <i>(tidak ada tsunami)</i>	Radio	1	1	
	TV	-	-	
	SMS	-	-	
	Phone	-	-	
	Loudspeaker	-	-	
	Patrol car	2	1	
	By word of mouth	8	-	
	Total	11	2	
			Grand total	35

Figure 9: Access to official information by source and time

⁴¹ Transcript Warga Biasa_05

How does information get to the people and who provides this information?

Most interviewees suggest that official information right after the earthquake should come from the government. People are aware that the information has to come very quickly. Some people provided an explanation on how they think the warning system works (or should work) and how the local authorities should provide information to them.

[Q:] If there is information, who do you trust to give you this information?

Well, at best the government...in the form of official information. If it is not the government [that provides the information] I consider it only as a rumour. We are already tired of rumours about earthquakes and tsunamis. [...] If it comes from the government we know that it is not fake. The government would not lie to us, I don't think. We are the ones to elect them, so they have to protect us people.

[Q:] How could this information be disseminated to the people?

Well, after the earthquake we need to be quickly informed whether there is a tsunami or not. Don't wait until the people have already become victims and only afterwards provide information. The government, actually, has to act very quickly. If not, well, then we can prepare for something like what happened [or: it'll end like] in Aceh. After the earthquake, it can be immediately announced. [...] So, if there is actually a tsunami all the loudspeakers have to be activated and the people have to be quickly informed. It should be arranged that when the Mayor speaks everybody could hear him. I am sure there is some equipment; nowadays there is high-tech equipment like that.⁴²

[Q:] If the government had announced [that there was no tsunami threat] and you had heard it would you still have run, *Ibu*?

Well, if the announcement came 1 hour after the earthquake, that would have been the same anyway, I would have run. If the announcement had come directly after the earthquake I would not have panicked. For an earthquake as strong as the one lately maybe I would have run anyway, but not that hurried. Because that would have meant that there was no tsunami, right? So maybe I would have just protected myself from aftershocks.

[Q:] According to you, *Ibu*, how should the government make these announcements?

Well, they should let us know directly, *Pak*. They could use loudspeakers. At the mosques there are loudspeakers, right?! But the information has to be really accurate and it has to be from the government. If the government announces it, it should be right. They know better whether there is a tsunami or not. I think they already installed some high-tech equipment out there in the sea. So just by using computers, they know [if a tsunami is coming].⁴³

⁴² Transcript Warga Biasa_18

⁴³ Transcript Warga Biasa_13

4.4 Conclusion I: people's reaction and access to information

Half of the people interviewed in the survey evacuated low-lying coastal areas in relatively short time. The trigger for evacuation was the strong earthquake. People are aware that an earthquake of such strength can cause a tsunami that would reach the coast quickly. People are also aware that a sudden low tide would indicate approaching tsunami waves. Many people trust what they can see with their own eyes, that is why they rely on the condition of the sea after an earthquake. In the absence of other (official) information, many went to the beach to see whether the water was retreating. As this was not the case most of them decided not to evacuate.

In Padang City, where more than 200,000 people reside in the tsunami hazard zone, there are few options for vertical evacuation to higher buildings or hills close to the coast. The time it takes from the moment when the water begins to retreat to the arrival of the first wave is only a few minutes. People will not have enough time to escape and save their lives if they wait for the seawater to retreat.

Official information was largely absent in the first 30 minutes after the earthquake. The vast majority of the people did not receive any official information on whether there was a tsunami threat or not. Information mainly spread by word of mouth and was based on rumours. Apparently, very few people had access to radios nor did many search proactively for information.

Over time (about an hour after the earthquake) the situation became clearer. The news that there was no tsunami threat and people could return home, aired on RRI and announced by the Mayor, gradually found its way to more and more people. However, even when people received information that there was no tsunami threat, many continued to evacuate because they were too afraid and did not trust the information. However, some interviewees suggested that the government should use (mosque) loudspeakers to get information to the people quickly.

The use of FM Radio frequencies to get the information to the people is an appropriate choice. However, official information in the form of clear guidance has to be widely available early on in order to reinforce – or cancel – the evacuation process. Since estimated tsunami wave arrival times for Padang are very short, information that is available only 1 hour after the tremor will come too late.

The evacuation process was snarled by massive traffic congestion. People were scared and in panic. They mainly escaped on motorbikes and in cars. There was massive traffic congestion. Many accidents occurred. The designated evacuation routes were not sufficient to channel the masses. For some people, the congested roads were a reason not to evacuate. In none of the interviews, the possibility of vertical evacuation, i.e. to high buildings, was mentioned. Apparently, people do not consider vertical evacuation an option. Evacuation proceeded only as a horizontal movement away from the coast and direction inland. The fact that people were headed towards the sea, while others were on their way inland created even more difficulties for evacuation and increased the chaos. In some areas, these traffic conditions continued up until about 3-4 hours after the earthquake.

There is a lack of understanding of the warning system but people trust the government to provide them with accurate information directly after an earthquake. Most interviewees have only a vague idea of how the tsunami warning system as a whole operates. Some assume that ocean observation technology like buoys will immediately and directly alarm the local government about an approaching tsunami

(which is not the case). People are not aware that in the first few minutes after an earthquake it is not possible to have certainty about the tsunami threat even from the perspective of forecasting and earthquake monitoring. From their perspective the most important thing is that they get accurate and official information quickly. There is a lack of knowledge on how the warning chain of InaTEWS works.

People trust their local government, especially the Mayor. They believe that the government would provide them with accurate information directly after an earthquake. They are aware of the difficulties with disseminating information in the chaotic situation after an earthquake. However, they have considerable expectations of the government to provide information in a very short time. And they have suggestions on how to get information to them in a direct and timely manner, e.g. by way of mosque loudspeakers.

4.5 Reaction by government institutions and other actors

The first 30 minutes after the earthquake in Padang for most people had passed without clear and official information whether there was a tsunami threat or not. A look at what happened during this period in time amongst the institutions that are in charge of getting information to the public completes the pictures and helps to understand how the warning system in Padang worked – and to understand what did not.

Those who got the message first: Padang's Operations Control Centre

This agency, which is under the auspices of Padang's BPBD, took immediate action when the earthquake subsided. Several staff members of the Operations Control Centre (*Pusat Pengendali Operasi – PUSDALOPS*) went back inside to make repairs to the information and communication equipment, despite being unsure of the stability of the building or whether there would be any aftershocks.

In about four minutes, they had completed repairs to equipment that is a source of incoming information. First, they repaired the computers with Internet access that provides them with information about earthquakes wherever they occur, including information about tsunami potential from BMKG that hosts the NTWC.

Then I went outside again to switch on the generator to power the equipment. The first thing we got up and running was the *RANET* [see footnote⁴⁴]. With the help of my colleague and a contractor [who was present at that time], we tried to get the Internet back up on the computer network. And after about four minutes, it was up and running again....⁴⁵

As well as fixing the computer equipment, they also made repairs to the radio communication equipment, which the earthquake had hurled on to the floor. When that was working again, the only thing they could hear was the sound of people panicking about a tsunami coming. There were also lots of reports of damage and deaths and injuries following the earthquake.

⁴⁴ Respondent frequently used the term 'RANET', which refers to a satellite-based technology (Radio Internet) that sends information via satellite to remote computer terminals. RANET was actually not operational at that time. It was later confirmed that the respondent referred to the computer that is usually connected to the Internet and an application (by *Air Putih*, a foundation working on IT solutions) that immediately retrieves the latest earthquake information or warning from the BMKG server when connected to the Internet.

⁴⁵ Transcript Aktor Kunci_04

After about 4-5 minutes, PUSDALOPS received information from BMKG via Internet (using the *air putih* application⁴⁴). The information on the screen informed them that there was no tsunami potential from the earthquake.

After about 4 minutes the internet was up and running again, and we got news from BMKG that the earthquake had been of 7.6 magnitude and that there was no tsunami potential.⁴⁶

This information was then immediately passed on via communication radio, which was the only media still functioning. Using 143.900 MHz, the staff of the operations centre announced the information.

I said: "This is the Padang City Operations Control Centre. A 7.6 magnitude earthquake has just occurred. Its epicentre was to the northwest of Padang city, and there is no tsunami potential." I repeated the message four times.⁴⁷

Getting the message to the Mayor

At the same time, some PUSDALOPS staff members took the initiative to go to the Mayor's official residence. It was not possible to make radio contact with the Mayor⁴⁸ or his office and they were not sure whether he had received the information. The fact that the Mayor makes broadcasts on RRI Padang after an earthquake encouraged them to get information to the Mayor as soon as possible.

Our agency is responsible to the Mayor, so he has to be kept informed. He usually does a broadcast on RRI when there's an earthquake. We thought he might not have the information. [...] Normally he gets that kind of information by text.⁴⁹

But when the command centre staff arrived at the official residence of the Mayor, he had already left.

How the information made its way through the radio communication networks

According to the operations centre staff, most of the people on stand by on the frequency they used to disseminate the information from BMKG were RAPI (Inter Community Radio Indonesia) members and people with handy talkies. They automatically tune into this frequency when a disaster occurs.

Some personnel working at disaster management agencies in Padang are members of (RAPI) and the Amateur Radio Organisation of Indonesia (ORARI). These two organisations play a key role in radio communications. The frequencies used for coordination and sourcing information via radio in Padang are RAPI frequencies. ORARI allocates frequencies to the Indonesian Red Cross (PMI) and Search and Rescue (SAR) for their internal coordination. PMI communicates on 142.400 MHz and SAR on 142.900 MHz. ORARI devotes these two frequencies entirely to these two organisations.⁵⁰

The information communicated by the Operations Control Centre was received by the other agencies involved in disaster management. Padang SAR, the police and armed

⁴⁶ Transcript Aktor Kunci_04

⁴⁷ Ibid

⁴⁸ It could not be clarified during the research for this study why no contact between the Mayor and the Operations Centre could be made.

⁴⁹ Transcript Aktor Kunci_02

⁵⁰ Transcript Aktor Kunci_02 and Aktor Kunci_05

forces, the fire service, and the Indonesian Red Cross were some of the agencies to receive this information. Although not all of them got the information directly from the Operations Control Centre, the preliminary information communicated by the disaster response command centre prompted them to go on stand by on the emergency frequency.

At the office of Padang SAR, immediately after the earthquake several people took the initiative to start up their car engines and the communication radios inside their vehicles because they had been forced to turn off their generator for fear of power shorting out.

Then I turned off the generator straight away... I was worried that if the generator was left on, the tremors might make it short out, and perhaps even set on fire. After I turned off the generator, I went out and told my colleagues to start up their vehicles. Because most of them have communication radios in their cars. Because the power was out, the radios in the cars were all we could use.⁵¹

The SAR personnel operating the radio at that time said that after about 7-8 minutes they received information about the earthquake on the RAPI emergency frequency.

There was [information] on the communication radio. [...] They provided information about the earthquake. About the magnitude and the location. Then they also said that there was no tsunami potential.⁵²

The information from the radio was the only information they received.⁵³ On receiving this information, the radio operator, who is also a member of RAPI, communicated it on several emergency frequencies as well as on the frequency the SAR office uses for internal coordination.

Via their communication radios, the Padang Fire Service also received information about the earthquake from the Operations Control Centre on the RAPI emergency frequency. On receiving this information, they communicated it via communication radio, repeating the message that there was no tsunami potential following the earthquake.

When our radios started working, we immediately tuned into the emergency frequency, and about 10 minutes after the earthquake we heard someone from the PUSDALOPS giving information about the earthquake. Then we passed on this information on the same frequency to try to calm people down, because there was no tsunami threat.⁵⁴

As in all the other agencies, the first thing that personnel in the West Sumatra office of the Indonesian Red Cross did was to repair their communication equipment, which had been dashed to the floor by the earthquake. Realising that their FM RDS⁵⁵ equipment was not working, personnel turned to their communication radios to try and get information.

⁵¹ Transcript Aktor Kunci_13

⁵² Transcript Aktor Kunci_13

⁵³ One respondent mentioned that SAR had also received information via radio communication from the local branch of BMKG at Padang Panjang. However, this could not be verified during the field research and appeared rather unlikely.

⁵⁴ Transcript Aktor Kunci_07

⁵⁵ FM RDS uses a normal FM radio receiver programmed with Radio Data System technology. The device automatically transforms a digitally received signal from local radio stations into an alarm sound and a running text on the display. Already before the earthquake local FM RDS holders had been informed that FM RDS operations were permanently on hold.

We went back into the office and turned on the radio, which abruptly stopped working because the power was down. But we were still able to use our communication radios because they run on batteries. After making a few repairs, the radio was back on again.⁵⁶

The West Sumatra office of the Indonesian Red Cross said that they received information on the RAPI frequency, and according to respondents, the information they received came from the West Sumatra Disaster Response Command Centre at province level⁵⁷. After receiving the information that there would be no tsunami, the Red Cross radio operator informed other Red Cross personnel who were out in the field with handy talkies. But this was done only after the head of the West Sumatra office of the Indonesian Red Cross gave the order to use megaphones to pass the information on to the people in the streets.

The staff at the Operations Control Centre was well aware of the fact that they had limited access to the public. The information they disseminated could only be heard by a limited number of people who had radio equipment and had tuned in to the right frequency. Furthermore, the information to the public, who were in the midst of evacuating and in a state of panic, was perceived in different ways. Many did not believe the information and still chose to evacuate.⁵⁸

Not all the people have handy talkies and had tuned into our channel. So they did not get the information. Besides that, many people believe more in what they directly 'experience' instead of what they get in terms of information. So even if they got the information that the earthquake had no potential for a tsunami they still evacuated.⁵⁹

Those institutions that had access to radio frequencies received the information from PUSDALOPS and forwarded it. Besides that, the operations centre had no other communication channel available. There was no direct link between the operations centre and the general public.

One example shows how a community – though indirectly – received the information. A neighbourhood group in Padang, established in 2008⁶⁰, was equipped with radios and power back up. On reception of the information from the operations centre they disseminated it further within the neighbourhood.

Surely, we got it [the information]. At the post there in the front we have a communication radio. After the earthquake, one of the responsible people immediately activated the radio. [...] From the radio he got the information that the earthquake had no tsunami potential. After that, he informed the other people in charge via radio communication, they also carried handy talkies.⁶¹

Military and police commanders apparently received information about the earthquake via text message from BMKG, but this information was used only for coordinating with their structures using handy talkies on their own internal frequencies. The military and police personnel who received this information communicated to others on their own

⁵⁶ Transcript Aktor Kunci_10

⁵⁷ This information could not be verified. Other key actors said that there was no information from province level authorities.

⁵⁸ Transcript Aktor Kunci_10

⁵⁹ Transcript Aktor Kunci_04

⁶⁰ KOGAMI supported this community as part of a pilot project. The objective was to raise awareness, develop evacuation plans and procedures and link neighbourhoods via radio communication to PUSDALOPS.

⁶¹ Transcript Aktor Kunci_14

initiative after witnessing how distressed people were. Apparently, there was no clear order from their commanders to widely disseminate the information.

About 15 minutes after the earthquake, the radio traffic operator said on my handy talkie that the earthquake had been magnitude 7.6 and that there was no tsunami potential. But still I rushed home to check on my family.⁶²

Getting the information to the public: the Mayor at RRI

The consequences of the earthquake were felt strongly by RRI Padang. Because the main power was out, they started fixing the generator to power the station to go on air. They knew that the Mayor of Padang comes to RRI to do a live broadcast and provide people with information. About 15 minutes after the repairs were made, the transmitter and broadcast equipment were up and running, just as the Mayor arrived at the RRI Padang offices.

Immediately after the earthquake, our technicians started repairing the generator. After about 10 or 15 minutes, the generator started up...which meant we could use the transmitter again.⁶³

According to the results of the interviews, when he arrived at the RRI offices 15 minutes after the earthquake, the Mayor had received no information about the earthquake. This was because the cellular phone network provider through which the Mayor usually received text messages about earthquakes from BMKG Jakarta could not be used. The *Telkomsel* network was down after the earthquake.

20 minutes after the earthquake the Mayor had still to receive any official information about the earthquake that had just occurred. So, when the Mayor went on air on RRI, he advised people to not panic but stay on alert. He told them to gather together family members and move to higher ground. According to the information that could be obtained during the research,⁶⁴ five minutes into the Mayor's broadcast, a person at RRI Padang offices received a text message about the earthquake from BMKG via his cell phone on the *XL* network, which unlike *Telkomsel* was unaffected by the earthquake. The Mayor was informed immediately in the RRI studio, and he in turn immediately broadcast the information contained in the text message and called on people to remain calm and return to their homes, because there was not going to be a tsunami.

That was the first time (about 30 minutes) after the earthquake that the information that there was no tsunami threat had reached a wider public – however, only those who had access to a radio.

Other radio stations in Padang

ProNews is one of the commercial radio stations in Padang that has reported on events related to earthquake and tsunami disaster management in Padang. After the earthquake, the station could not use its equipment because the main power supply was down and they had no back up generator. ProNews' broadcasting and communication equipment was still operational. However, it took the station three days to go on air again due to

⁶² Transcript Aktor Kunci_11

⁶³ Transcript Aktor Kunci_08

⁶⁴ It was not possible to directly verify this description of the situation at RRI with the Mayor or a representative of his office. However, the results of the study were presented to and discussed with high-level government representatives, including the Vice Mayor.

power outage. Directly after the earthquake they communicated information via communication radio in the station's offices after they received information on the RAPI Padang network frequency and via SMS directly from BMKG.⁶⁵

Classy FM, which has its studios in *Semen Padang*, a cement factory complex, was not affected by the power outage after the earthquake. Less than 5 minutes after the main power supply went down, the station got back up power from the factory's generator. They retrieved the earthquake information from the BMKG website. However, the main problem following the earthquake was that their transmitter had shifted, which meant that Classy FM could not go back on air immediately. They eventually managed to do so at around 7:30 pm.⁶⁶

4.6 Conclusion II: reaction by government institutions and others

The information from BMKG reached the authorities in Padang within 5 minutes of the earthquake. Padang's Operations Control Centre quickly received the information from BMKG almost immediately after it was issued, about 5 minutes after the earthquake. The Internet connection was their only link to BMKG that was still working. Information from BMKG was also received via Short Messaging System (SMS). However, the earthquake left several cellular telephone operators unable to function, which meant that warning text messages from BMKG via SMS were only received by very few officials. Therefore SMS does by no means qualify as a single source of information and warnings from BMKG.

The authorities disseminated information and guidance to the general public only about 30 minutes after the earthquake. The experience of the earthquake on 30 September 2009 indicates that there was no communication between the Mayor and the Operations Control Centre as the municipal government agency in charge of disaster management. On the day, these two actors operated alone. The Mayor, who has been on RRI Padang after every earthquake since 2005, could not receive information from BMKG via text message due to the network outage. The Operations Control Centre was only able to rapidly communicate information via communication radio but not to a wider public. The operations centre forwarded the information from BMKG without providing additional guidance on what people should do, i.e. that there is no need to evacuate and that people can return home.

The information from BMKG had reached Padang authorities (i.e. the operations centre) about 5 minutes after the earthquake but was only available to the public about 20 to 25 minutes later, when the Mayor announced it on RRI. Comparing the time it needed to get the information to the people with the estimated arrival time of tsunami waves at the coast of Padang (30 minutes after an earthquake) it has to be concluded that the information came too late.

Other government and non-government disaster organisations quickly received information from the Operations Control Centre via radio communication networks. The fact that certain VHF channels are assigned as emergency frequencies enabled quick information dissemination when the members of RAPI instantly tuned in to the agreed channel. The institutions could then forward the information through their individual frequencies. However, apparently only the Indonesian Red Cross informed the public by using megaphones.

⁶⁵ Transcript Aktor Kunci_06

⁶⁶ Transcript Aktor Kunci_12

Though military and police had received the information through their communication chains rather quickly, there was, apparently, no order to provide the information that there is no tsunami threat to the public.

Local FM radio brought official information to the public. RRI Padang was able to go on air about 15 minutes after the earthquake. However, they had not received information from BMKG. Apparently, there was no information broadcast before the Mayor arrived at the station. The other two radio stations that have been visited during the research struggled with either power outage or the fact that their radio transmitter had shifted due to the tremor. However, both, *Pro News FM* and *Classy FM*, received the information from BMKG via VHF or retrieved it from the BMKG website early on.

5. RECOMMENDATIONS

Though there was no tsunami threat and the NTWC at BMKG did not issue a tsunami warning, the experiences from the earthquake on 30 September 2009 in Padang provide important lessons on how to improve warning dissemination procedures, increase the effectiveness of public dissemination and increase people's awareness and response capability. The following recommendations aim to support the strengthening of these capacities both on the part of the government as well as the community and non-government organizations.

Increase community awareness with regards to natural warning signs and reaction.

The immediate evacuation of the coast, to higher ground and to high-buildings after a strong earthquake is the only appropriate reaction to the threat from local tsunamis. Relying on the natural warning sign of retreating seawater as an indication of an impending tsunami is not an option for the City of Padang. The first tsunami wave will arrive within a few minutes after the water has retreated. People will not have enough time to escape if they wait for this natural warning sign. Traffic congestions, overall chaos and panic will make it impossible for people to save themselves.

Tsunami awareness campaigns in Padang have to make this issue a priority. Local stakeholders in Padang already agreed on an appropriate evacuation scheme that relies on (1) strong ground shaking as the first trigger for immediate evacuation and (2) the information from BMKG and/or the guidance from local authorities that reinforces this reaction or cancels evacuation. This strategy needs to be officially recognized and widely promoted. Outreach activities need to communicate the strategy to the community. A local media campaign can strengthen people's knowledge on how to react appropriately. At the same time, however, local authorities have to make sure that they can get warnings and guidance to the people in time.

Increase people's awareness with regards to the warning system and how it can serve them. People need to have a basic understanding of how InaTEWS works. This includes basic knowledge of the tsunami warning chain: BMKG provides information to local authorities and national TV and radio stations within 5 minutes of an earthquake; based on this information local authorities disseminate guidance to the public, and either officially call for evacuation or cancel evacuation.

Outreach activities at grass root level as well as media campaigns have to pass this knowledge on to the people. These activities also need to make sure that people know the sources of the information and the kind of guidance that they can receive after an earthquake: where to get information from (e.g. FM radio frequencies, mosque loudspeakers) and what this information will tell them (e.g. the meaning of the tsunami siren sound).

However, it also needs to be communicated that people do not have to wait for warning from BMKG and/or guidance their authorities after a strong earthquake to start evacuation. But they need to pro-actively search for information.

Organisations such as the local NGO KOGAMI and the Indonesian Red Cross play a vital role in community outreach. However, the outreach material of these organisations still differs in terms of content. In a joint effort, that clearly involves the local government (especially BPBD) as the provider of warnings and guidance, the content of these outreach materials needs to be reviewed and adjusted to the agreed evacuation scheme.

Provide Padang's Operations Control Centre with the authority and mandate for decision-making and direct dissemination of public guidance. The local Operations

Control Centre in Padang received the information from BMKG within minutes of the earthquake. However, there was no information exchange between the Mayor and the operations centre. With estimated arrival times of about 30 minutes after a major earthquake, time is the most important criteria for setting up the local warning system.

This challenge requires other arrangements than the usual command chain. The operations centre should be granted the authority to make the decision on whether the people of Padang need to evacuate or not and to disseminate guidance to the public immediately without prior approval by the Mayor. This follows the logic of decision-making Standard Operating Procedures (SOP) that translate standardized warning from the NTWC into standard reaction at the local level. Agreed and approved by local authorities long before the case of emergency, these procedures save time and bring clear guidance to the people as quickly and direct as possible.

The study results show that people trust the information from the government after an earthquake, especially the information that comes directly from the Mayor. Experience shows that a warning without clear and credible guidance on what to do does not trigger consistent reaction. It should be part of the SOP that the operations centre and the Mayor establish contact via radio frequencies directly after an earthquake has ended. If in case of emergency this communication can be established before the information from BMKG comes in the Mayor can be directly involved in the decision making process and disseminate guidance himself. The local *RABAB* technology (see below) can be used to implement this. However, if for whatever reason no communication link can be established, the operations centre needs to have the mandate to take a decision immediately and instantly disseminate the guidance to the public via all available channels, including local FM radio frequencies. The authority and credibility of the local operations centre to make public announcements needs to be communicated to the public in order to make sure that people understand that the centre announces information on behalf of the government of Padang – and the Mayor.

Provide Padang's Operations Control Centre with sufficient human, financial and technical resources to do their job. Early warning and disaster preparedness is a new field for Padang's BPBD that was only inaugurated in January 2009. The importance of BPBD and the Operations Centre (as a unit of BPBD) in tsunami preparedness needs to be fully recognized in local policies. The local regulation on Tsunami Early Warning is an important and promising step. However, the budget requirements of BPBD and the Operations Centre also need to be integrated into local planning and budgeting. Only with full government commitment to and support for a solid institutional structure, skilled and trained personnel for 24/7 operations and fully equipped with all necessary technical devices for receipt of information and dissemination, BPBD and the Operations Centre will be able to perform their duty.

Extend the scope of the public warning dissemination system in Padang. The study shows that official information reached very few people within the first 30 minutes after the earthquake. Cellular phone networks do not qualify as (a single) solution to receive or disseminate information. Radio communication (via VHF) has proven to be most reliable. However, VHF communication alone does not provide access to the general public. Though with technical difficulties and delay, broadcasts on FM radio (such as RRI) have proven to be a sufficient way of getting guidance to the people. The *RABAB* communication technology of Padang (developed based on a model from the District of Bantul, Java) can translate a VHF signal into a FM radio frequency. This allows for public dissemination on public radio channels and announcements via mosque loudspeakers (if connected to a FM receiver). This means that an officer on duty in the

Operations Control Centre or the Mayor himself can directly announce guidance to the public from a remote location. This technology needs to be fully implemented, officially recognized and maintained. The following actions are recommended:

- **Significantly extent the warning dissemination system via mosque loudspeakers.** A pilot project by KOGAMI (with support from GTZ IS-GITEWS) was implemented in 2009-2010. So far only 20 mosques have been connected. This scope needs to be extended. The direct involvement of communities and building ownership is a key factor for success. Outreach activities through community meetings at mosques that discuss the evacuation scheme, local evacuation options and provide knowledge on the warning system as well as evacuation procedures need to accompany the installation of FM receivers at mosques.
- **Revisit the agreement on a local FM radio frequency as a source of official information.** It is recommended that the stakeholders in Padang further discuss whether the (already) suggested FM frequency of 99.9 provides an effective way of getting information to as many people as possible. It has to be kept in mind that the people of Padang are used to getting information from the Mayor who usually can be heard on the channel of RRI after an earthquake. If the new frequency is officially agreed and recognized the public has to be widely informed about it. However, it is recommended to use all available FM radio channels to broadcast information and to synchronize the different frequencies.
- **Promote the use of FM radios as a source of information.** The community's access to radios is still limited. This is partly due to the fact that for many the use of public radio in times of other media, i.e. TV and Internet is not very common. Outreach activities need to address this issue.

Create multiple links to BMKG. The use of multiple communication channels is necessary to ensure that as many people as possible are warned and to deal with failure of any one channel. This is important not only for local dissemination but also for the receipt of information from BMKG. In order to avoid information bottlenecks several local (government as well as non government) institutions need a direct link to the NTWC at BMKG. Local radio stations play a very important role here. They can get the information directly from BMKG and forward it to the public and/or receive information from local authorities via radio communication. To still be able to operate they need to be equipped with back up power and solid infrastructure.

Provide sufficient evacuation infrastructure and promote clear procedures. Shortly after the earthquake in Padang the roads were blocked with vehicles, which made evacuation almost impossible. During the research some respondents indicated that they did not evacuate since there was no hope of getting anywhere. Several assessments did identify buildings for vertical evacuation. Plans for the construction of vertical evacuation shelters in the red zone are available in Padang but need to be implemented urgently. The ongoing reconstruction planning process in West Sumatra and Padang provides a good opportunity to do so. The evacuation plan for the City of Padang needs to be reviewed based on an official tsunami hazard map that delineates the estimated inundation area of a major tsunami and the evacuation infrastructure.

The evacuation plan that also includes information on the evacuation scheme, access to information and procedures needs to be officially approved, widely distributed among government and non-government institutions and communicated to the public. The official evacuation plan (and map) for the city can then serve as a reference for evacuation-planning activities at neighbourhood level that will help the people at risk of a

future tsunami event to know where they get information from and to determine where to go to in case of emergency.

The results of the study show that many people gathered with their families first before they started to evacuate. Special emphasize needs to be put on the development of individual and family response and evacuation plans that enables people to act immediately and independently to the tsunami threat. Clear agreements between e.g. schools (that need to develop their own evacuation plans) and parents clarify where to go and where to assemble with family members and will save time in case of emergency.

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