

REPUBLIC OF RWANDA
MINISTRY IN CHARGE OF EMERGENCY
MANAGEMENT



NATIONAL CONTINGENCY PLAN
FOR EARTHQUAKE

February, 2019

PREAMBLE

A well-coordination of disaster and emergency response is a key factor of success in terms of life saving and property protection. One of the coordination tools is a plan, not only a document but and especially the planning processes which improve the possibility to reduce the uncertainty that may be fatal in responding to a disaster or an emergency

Planning requires the time of the participants. Time becomes more valuable once an emergency occurs, so planning before the emergency when workloads may be more flexible is very important.

One reason for conducting contingency planning is because it will facilitate a *rapid emergency response* by allowing planners, in advance of an emergency to:

- consider the likely consequences of an emergency before it occurs
- identify the key resources, both human and physical, which may be available to respond to the emergency
- identify the critical areas for immediate action
- build and train the emergency response team in advance
- define the general strategies and approach to the emergency in advance

All of these measures allow constructive intervention immediately after the emergency. Team building is particularly useful, as the ability to act as a team may be critical to the success of the initial emergency response.

Another benefit to contingency planning is that, before an emergency, there is comparatively more time to consider all the aspects of problems that are likely to arise. Once the emergency has occurred, it may be very difficult to bring all of the players together. Agreement on policies in the contingency planning stage may help clarify applicability and resolve contradictions that may occur. *Rapid decision making* on operational issues after an emergency is important because delays may cost lives.

The contingency plan also serves as a tool for *maintaining control over events or limiting the risk of loss of control*. Because of the scale of the problems that they pose, emergencies sometimes provoke erratic or unpredictable responses. Well-intentioned but ill-equipped agencies may rush to help, leading some agencies to over-react to the emergency. The risk of inappropriate responses is much lower when clear plans are in place.

Finally, the contingency planning process allows identification of projected needs that may arise as a result of an emergency and the resources that will be immediately available to meet those needs.

It is in the above outlined context that this National Contingency plan for earthquake is proposed as a tool to be used to any major earthquake phase. Partners in disaster management have to understand and consider the proposed strategies and actions and are ready to use it in an efficient manner.

This plan should be updated regularly through participatory processes in order to incorporate new ideas and best practices and bring on board new partners.

With such “system” elaborated in advance and willingness of different actors to implement their responsibilities before, during and after an earthquake our country will be surer of capabilities to effectively protect people and properties

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LIST OF ABBREVIATIONS/ACCRONYMS

CP: Contingency Plan

DIDIMACs: District Disaster Management Committees

DDMOs: District Disaster Management Officers

DRC: Democratic Republic of Congo

EEWs: Earth quake Early Warnings

EWSA: Energy, water and Sanitation Authority

Eng Rgt: Engineering Regiment

MINEMA: Ministry in Charge of Emergency Management

MINALOC: Ministry of Local Government

MINEDUC: Ministry of Education

MININFRA: Ministry of Infrastructure

MINIRENA: Ministry of Natural Resources

MoH: Ministry of Health

NADIMAC: National Disaster Management Committee

NADIMATEC: National Disaster Management Technical Committee

NDMP: National Disaster Management Plan

NDRMP: National Disaster Risk Management Plan

NCPE: National Contingency Plan for Earthquake

NGOs: Non-Government Organizations

NPDM: National Platform for Disaster Management

RAB: Rwanda Agricultural Board

RBA: Rwanda Broadcasting Agency

RDF: Rwanda Defense Forces

RHA: Rwanda Housing Authority

RMB: Rwanda Mines, Petroleum & Gas Board

RNP: Rwanda National Police

RRC: Rwanda Red Cross

RSB: Rwanda Standard Board

RTDA: Rwanda Transport Development Agency

SEDIMACs: Sector Disaster Management Committees

UN: United Nations

UNDP: United Nations Development Programme

WFP: World Food Programme

WHO: World Health Organization

EXECUTIVE SUMMARY

This contingency plan covers the planned activities to be undertaken in case of an earthquake with scenarios for the likely occurrence based on the historical experiences and the geological activity in the rift valley region.

The overall objective of the Contingency Plan for earthquake (NCPE) is to support the timely, consistent and coordinated response to anticipated earthquake cases and its aftershocks like landslides and fires by effectively minimizing the impact of the earthquake on human population, livelihoods, lifelines, properties and the environment. This will in turn help reduce the scale of humanitarian needs to the affected population.

The contingency plan shall be implemented at two stages before and after an earthquake. Before an earthquake event, mitigation strategies both structural and non-structural will be underlined and emphasize on what activities to undertake in order to lessen the impact that an earthquake could have on communities. Preparedness measures come into making clear what measures to take prior to an earthquake.

The incident command after an earthquake has two levels: the management of response activities and the coordination of humanitarian actors. The role to be played by each intervener/responder is incorporated in the incident command description clearly. A user of this contingency plan should be informed that everything is based on developed scenarios and assumptions which are the main determining factors responsible for the scope and depth of the emergency to be managed therefore regular updates should improve the objectivity and the effectiveness of this document

I. INTRODUCTION

The plan provided in this document has been created to show the concept of operations for the response to a major earthquake. It shows agreed roles and responsibilities for agencies participating in the emergency response. The plan ensures that the national level response is coordinated, can be activated immediately and automatically, and is as effective and as efficient as possible within the constraints of this event.

Due to the irregularity of major earthquakes, it is not easy for one to conceive the amount of devastation that can occur, and it is therefore also difficult to develop a positive attitude toward emergency response support. One of the reasons is the difficulty in spotting the invisible vulnerabilities caused by the different environment at the time an earthquake strikes. Numerous virtual experiments are inevitable to gain a better understanding of the risks and dangers of such situations. In view of the aforementioned, we strongly recommend the construction of a scenario system capable of simulating varying levels of earthquake disaster and calculating the degree of danger and emergency for each situation. This paper discusses the outline of such a system;

1.1. The earthquake Profile in Rwanda

Owing to Rwanda's geographical location and its geological formation, the country is susceptible to earthquakes. Earthquakes have been reported since the late 1900s. Population growth has and still is positive and this has been accompanied by an escalated vulnerability of the population to earthquakes among other hazards especially in prone areas- District along the lake Kivu and the rift valley.

The Ministry in Charge of Emergency Management was mandated in reaction to the recognition of the ever-increasing threat that landslides and other hazards related to the earth movement to put in place adequate measures to ensure human lives and safety of properties.

This part of the plan will cover the nature of the earthquake threat to Rwanda, the location of source zones for earthquakes affecting Rwanda, the damage frequency, and the potential hazards associated with the occurrence of an earthquake. It also covers the concepts for response in the situation related to the earthquake hazard.

1.2. Nature of Earthquake Risk

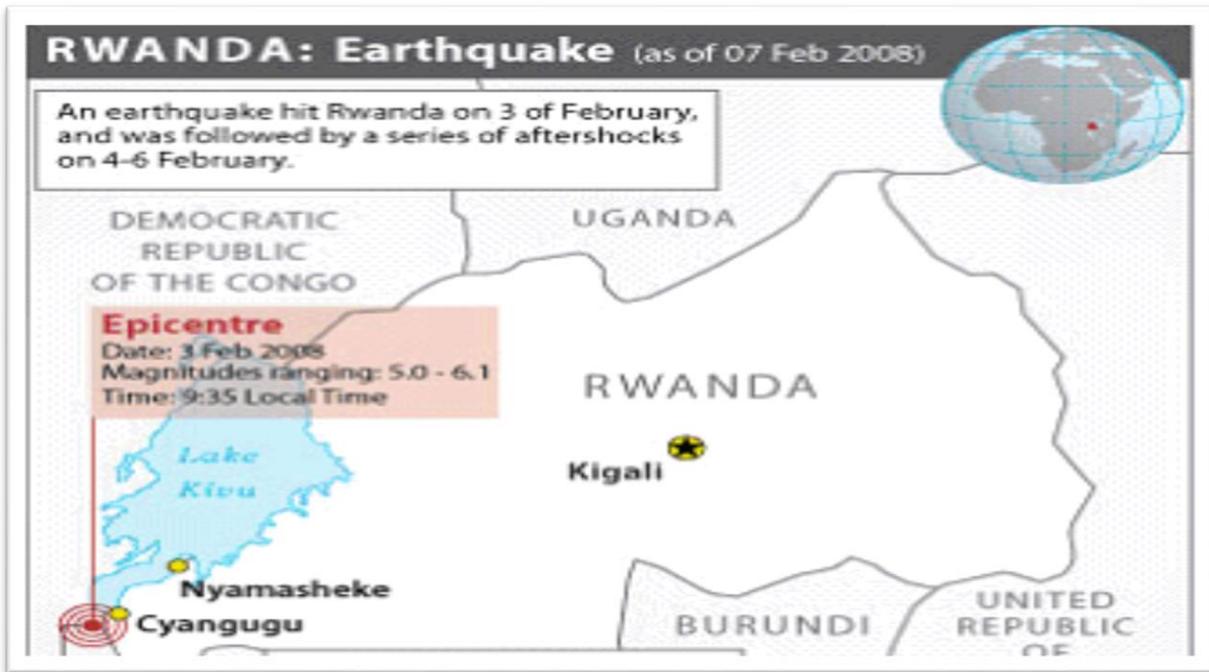
In 2008 Rwanda recorded an earthquake with a magnitude of 6.2.0 earthquake hit southwestern Rwanda on Sunday 3rd February and 116 people were confirmed dead and 1,643 injured and traumatized; 1,201 homes as well as hospitals, health centers and schools have been destroyed by series of earthquakes which struck Rwanda and Democratic Republic of Congo (DRC) in its eastern part. The most powerful occurred within hours of one another with magnitudes of 6.2 and 5.0 respectively. Aftershocks were reported on 3, 4, 5 and 6 February. In Rwanda, the earthquake mainly affected the densely populated districts of Rusizi and Nyamasheke which had a combined population of over 800,000 people.

Three secondary schools and one primary school have been closed. The Ministry of Education has indicated that 4 secondary and 20 primary schools have been totally damaged. Some hospitals have been affected including Bushenge Hospital which has been reported to be destroyed at 80%.

In addition, the Governor of the Western Province reported 1,201 homes totally destroyed on the time. These include 300 homes in Nkombo Island. Although some families are being accommodated by relatives at least 50 families in Nkombo Island are homeless and require urgent support.

In 2016 Rwanda recorded another earthquake on 23/09/2016 and on 26/10/2016 in Rusizi and Nyamasheke Districts which damaged 68 houses including Kamembe morden market, Mashsha Health Center in Gitambi Sector, also one Hotel in Kamembe City and different commercial houses.

The Goma Volcanic Observatory has expressed fears that there may be additional earth movements of serious magnitude.



1.3. Purpose & Scope

1.3.1. Purpose

The plan describes the response system in the event of a major Earthquake in Rwanda, and also denotes the total responses, which should be provided at the event area.

The purpose of the plan will be to:

- a) Prevent and mitigate emergencies by reducing the chance of an emergency to happen, or reduce the damaging effects of unavoidable emergencies
- b) Assign specific responsibilities for emergency response to agencies
- c) Coordinate response and support activities countrywide;
- d) Ensure timely response so as to save lives and minimize injuries and property damages

1.3.2. Scope

The plan provided in this document has been created to show the concept of operations for the response to a major earthquake. It shows agreed roles and responsibilities for agencies participating in the emergency response. The plan ensures that the national level response is

coordinated can be activated immediately and automatically, and it is effective and as efficient as possible within the constraints of the event.

1.4. Authority and Responsibility

The Ministry in Charge of Emergency Management (MINEMA) together with the Ministry of Defense (MoD) are responsible for leading all preparedness, emergency response and relief activities for earthquakes. However other institutions like RNP, Ministry of Health (MoH) and Rwanda Mines, Petroleum & Gas Board (RMB) have key roles to play.

1.5. Relationship to the National Disaster Management Framework

This plan is a sub-plan of the National Disaster Risk Management Plan (NDRMP) and an implementing tool of the National Disaster Management Policy (NDMP). Authority, roles and responsibilities of line Ministries, the National Disaster Management Committee (NADIMAC), the Joint Intervention Management Committee (JIMC), the National Disaster Management Technical Committee (NADIMATEC) the National Platform for Disaster Management (NPDM), the District Disaster Management Committee (DIDIMAC) and the Sector Disaster Management Committee (SEDIMAC) remain the same as outlined in the NDMP and the NDRMP except in those instances where actions specific to earthquake response are needed.

1.6. Scenarios Development

This scenario is provided for planning purposes only and is not intended to be representative of what may or may not happen in a real earthquake which is impossible to predict with certainty. Earthquake damage and shaking intensity is dependent on a variety of factors. In as much, these scenarios are supplied to help you think through a planning process of how you might react in an earthquake.

1.6.1. Main incident scenario

On October 21, 2015 at 10:15 a.m., a magnitude 6.5 earthquake occurs on the Lake Kivu coast causing a 5m rupture in different areas from Rusizi to Rubavu Districts through Nyamasheke,

Karongi and Rutsiro Districts. The slip along the fault measures 30 feet in some areas. The shaking lasts over 5 minutes. The physical damage to affected districts infrastructure is catastrophic. There is no electrical power. There are many water main breaks that reduce the availability of water. Main and secondary roads are damaged and impracticable, 43 bridges totally damaged and impracticable, Electrical installation and communication infrastructure of MTN, AIRTEL/TIGO seriously affected, the network is very weak and sometimes lost. Major fire cases are reported in Rubavu and Rusizi District. The resulting large wildfire can be seen from Karongi city and the major part of Nyamasheke District. It is estimated that over 100,000 people are homeless.

After three hours already 1,000 people are reported dead and there is an estimation of more than 10,000 people injured and over 1,000 people are missing.

Gihundwe and Gisenyi hospitals are totally destroyed, while Bushenge hospital is 40% destroyed; six health centers in Nyamasheke, Rutsiro and Rubavu Districts are totally destroyed. Public facilities are seriously affected. Schools, market were seriously affected.

1.6.2. Aftershocks

Aftershocks will occur following a crustal earthquake such as the scenario event.

Aftershocks for the scenario earthquake could reach magnitude 5.0 or greater. They disrupt impacted communities by causing additional damage to already weakened buildings and infrastructure, impeding relief efforts by making it unsafe to enter damaged buildings, causing more injuries and deaths, and placing an enormous toll on the mental health of an already shattered community. Earthquakes incident had a significant number of aftershocks greater than magnitude 4.0 within the first week to 10 days after the main shock. The 2008 Rusizi and Nyamasheke earthquake had a number of aftershocks ranging from M5.0 to M6.8 in the twenty days after the main shock.

- **Fires**

Fire represents a serious post-earthquake hazard; this is another area requiring additional research and study not addressed by the project team. The loss estimation model generated by the scenario event used by this plan indicates the earthquake will cause about 20 fires, burning structures valued at nearly a half-billion dollars and displacing about 1,000 people.

- **Landslides**

Earthquakes are a major cause of landslides. Landslides, in turn, are a major contributor to the damage and casualties associated with earthquakes. It is important to quantify this association between landslides and earthquakes. Each type of earthquake-induced landslide occurs in a particular suite of geologic environments. These range from overhanging slopes of well-indurated rock to slopes of less than 1° underlain by soft, unconsolidated sediments. Materials most susceptible to earthquake-induced landslides include weakly cemented rocks, more-indurated rocks with prominent or pervasive discontinuities, residual and sand, volcanic soils containing sensitive clay, loess, cemented soils, granular alluvium, granular deltaic deposits, and granular man-made fill. Few earthquake-induced landslides reactivate older landslides; most are in materials that have not previously failed.

Based on current knowledge of landslides in Rwanda and theoretical studies, the severity of seismically induced landslides and related damage is dependent on the level of ground shaking at the time of the earthquake. Landslides not seismically induced are seasonal, with a rough correspondence between monthly rainfall and reported landslides due to lag time for build-up of groundwater level in the slopes.

The February 2008 Rusizi and Nyamasheke earthquake generated about a hundred landslides in the region spread out over a large area; precipitation after the earthquake increased the probability of landslides occurrence even some years after.

Areas likely to experience a number of seismically induced landslides during the scenario include slopes close to the fault where the ground motion is high and areas affected by landslides in the past. In this scenario we expect that landslides will affect different households because of ground motion, soil type, elements at high slopes $\geq 15^\circ$, and vulnerability of houses and public facilities.

II. PRE-EARTHQUAKE MEASURES

2.1. Introduction

2.1.1. *Prevention and mitigation structural measures*

- **Establishment of building codes**

During an earthquake the ground shakes, causing a building to sway. To withstand this movement a new building will have a structure system strong enough to carry the earthquake forces yet flexible enough to respond to the ground motion without losing its strength.

To achieve this, a building height, and materials as well as the seismic hazard of the site based on data which Rwanda Bureau of standard (RSB) should set.

Non-structural components such as mechanical units and architectural elements like balconies, public utilities and public transport are also considered and taken into account when designing the structure according to the standard code to be set by RSB

- **Retrofitting of existing buildings**

Existing buildings in the area threatened by earthquake, their structure should be modified to make them more resistant to seismic activity, ground motion, or soil failure due to earthquakes. The retrofit techniques must be applied also to public offices, prisons, markets, churches, schools, hospitals, hotels, bars night clubs and private houses.

2.1.2. *Prevention and mitigation non-structural*

- **Hazard mapping and Monitoring**

Earthquake ground shaking varies from place to place and the hazard mapping in this plan will show this variability. The mapped hazard refers to an estimate of the probability of exceeding a certain amount of ground shaking, or ground motion in 50 years. The hazard depends on the magnitudes and locations of likely earthquakes, how often they occur, and the properties of the rocks and sediments that earthquake waves travel through. The national hazard maps will show the distribution of earthquake shaking levels that have a certain probability of occurring in Rwanda. These maps will be created to provide the most accurate and detailed information

possible to assist engineers in designing buildings, bridges, and utilities that will withstand shaking from earthquakes in Rwanda.

These hazard maps will be applied in building codes, roads and bridges design countrywide, insurance rates, business and land use planning, estimation of stability and landslides potentials of hillsides, construction standards for waste-disposal facilities, retrofit priorities and allocation planning of assistance funds for education and preparedness .

A National Earthquake information Center under Mining, Petroleum and Gas should be settled and be tasked to determine rapidly the location and size of all destructive earthquakes worldwide and to immediately disseminate this information to concerned national agencies, scientists and the general public. The National Earthquake Information Center should compile and maintain an extensive, global seismic database on earthquake parameters and effects that serves as solid foundation for basic and applied earth science research.

2.1.3. Earthquake Early-Warning (EEW)

Earthquake Early-Warning is a system that can provide a few seconds to tens of seconds warning prior to ground shaking during an earthquake, estimate the level of a ground shaking to be expected and issue a warning before a significant ground shaking starts. The purpose of such a system is to provide warnings in Rwanda especially in prone Districts. The warning message provided by EWW can be valuable to reduce the damage, costs and casualties resulting from an earthquake.

2.1.4. Public awareness and capacity building.

- **Campaigns**

The focus of campaigns is to provide uniform, large-scale impact with standard messages. There are many examples of large-scale national and international public awareness campaigns that have led to massive social change. Examples include childhood immunization, the wearing of seat belts in cars, and smoking restrictions. Campaigns comprise a set of activities that may include: publications, including billboards, posters, newspaper or magazine coverage, information cards, flyers, bookmarks and brochures curricula, modules and presentations,

including slide presentations and oral presentations e-learning performing and cultural arts games and competitions audio and video materials web pages and activities social media and telecommunications. MINEMA-MINALOC and Districts should organize periodic public awareness campaigns to keep population around the earthquake risk area updated on different prevention, mitigation and preparedness measures.

- **Participatory learning**

People are especially motivated by approaches in which they themselves participate in a solution, and especially when they believe it is their own idea. The focus of participatory learning is to engage people in discovery and problem solving for disaster risk reduction. At the heart of all of these activities is the community’s own experience of empowerment.

This involves using language, stories, songs and traditions to strengthen the emerging culture of prevention. This is typically accomplished through tools such as:

- Action-oriented research such as vulnerability and capacity assessment
- Disaster management planning
- Implementing risk reduction measures
- Monitoring and improving on plans through drills and simulations.

DIDIMACs and SEDIMACs should organize periodic participatory training and learning sessions for communities under the risk of earthquakes shakes.

- **Informal education**

The focus of informal education is taking advantage of brief moments and encounters to stimulate thinking and engage people in discovery of actions and behaviors to increase safety and resilience. Informal education in communities and schools is the most flexible of all approaches with respect to setting, audience and timeframe.

Types of informal education

Public	Group	Solitary
Home	School	Work
Television	Radio	Internet
A few minutes	A couple of hours	A day or two
Especially planned	Infused into ongoing projects/programs	Spontaneous

MINEMA and the NADIMAC should organize and prepare periodic messages to sensitize and inform the public on the earthquake risk and coping strategies

- **Formal school-based interventions**

The focus of formal school-based interventions covers two areas: school disaster management and disaster risk reduction in school curricula. These are considered to be formal because accountability and responsibility for school safety and curricula belong exclusively to education authorities, so they require support for long-term planning and capacity building. Whether there is one such authority, many, or seemingly none, the same issues of caution remain.

MINEMA and the NADIMAC should organize and prepare periodic messages to sensitize and inform the public on the earthquake risk and coping strategies

2.2.Preparedness Measures

2.2.1. Core emergency response systems

- **National Core group of Engineers/Architects for Earthquake, flood and landslides disaster response**

It is recommended to set up a National core group of Engineers/Architects from MINEMA, MoD, RMB, MININFRA, REMA, RTDA and WASSAC, etc who will provide technical expertise for mitigation, preparedness and response to earthquakes, floods and landslides.

- **The terms of reference of the core group of engineers will be as follows:**
 - a) Drawing up a strategy and plan of action for mitigating the impact of earthquakes
 - b) Provide advice and guidance to the state on various aspects of earthquakes mitigation
 - c) Develop/organize the development of handbooks/ leaflets/type designs for earthquake resistant construction
 - d) Work out the systems for assisting the state in seismically vulnerable zones to adopt/integrate appropriate codes of building standards.
 - e) Evolve systems for training of districts engineers as also practicing architects and engineers in the salient features of the code of building standards
 - f) Evolve systems of certificate of architects/engineers for testing their knowledge of earthquake resistant construction
 - g) Evolve systems for training of masons

2.2.2. *National, Institutional and Community Preparedness*

- **National preparedness**

Financial preparedness: A reserve fund for quick response to an earthquake disaster has to be established to ensure readiness of quick and effective operations.

MINEMA and MINECOFIN will set the response fund to be used in case of major disasters including earthquakes.

Material Preparedness: Stores should be established in different areas and include tents, water tanks, mobile toilets, blankets, mats, kitchen and hygienic set.

- **Institutional Preparedness**

- **MINEMA** should organize periodic training and simulation exercises to have in place enough skilled personnel in all involved agencies including First Responders Teams
- **RDF/Air Force/Eng Rgt:** Helicopters, High reach Excavators, bulldozers, water browsers, motor graders, cranes, compactors, rescuer trucks, trucks with cutting tools, fire extinguishers and skilled personnel should be made available upon earthquake early warning.
- **RNP:** Helicopters, fire trucks, canine brigade and skilled personnel should be made available upon earthquake early warning.
- **RRC:** Skilled volunteers and first aid tools available
- **UN agencies and INGOs:** Provide Technical expertise and financial support

- **Community Preparedness**

First responder's teams should be prepared to help community in readiness before and during an earthquake event for the attitude and actions to be taken. Flyers containing earthquake readiness tips should be available and periodically disseminated.

- **Mutual aid agreements**

Help from international humanitarian agencies and neighboring countries will be requested following standing protocols which should be signed in advance for preparedness purpose

MINEMA, MINAFFET should prepare clear guidelines and agreements to be used in regional and international interventions.

- **Information management, Communication and Public information**

A National Earthquake information Center under the Mines, Petroleum and Gas Board will conduct geologic hazards mapping across the state and works to identify our earthquake threats. In addition that National Earthquake Information center will work closely with intervening agencies to provide the most accurate, credible, and up-to-date scientific earthquake information to the public and emergency management community.

- **Planning response mechanism**

The first objective of the response mechanism is to improve the response capabilities of the main interveners and leaders in command at the time of an earthquake emergency.

The ability to respond and provide support in an emergency situation, such as judgments on related circumstances, decisions and judgments on policies or the evaluation of initial information received from a disaster-stricken area, depends on a knowledge of daily crisis control, recognition and experience in responding to various crises, and an understanding of actual disaster situations. In particular, it is very advantageous to have experience in responding to similar disasters. Although risk is evaluated as a product of the probability of occurrence and loss, even if the probability of a large-scale earthquake is small, the risk is great because the loss caused by damage is immense. The focus is not always the individual(s) in charge of emergency response, but the key person(s) with a major role in command.

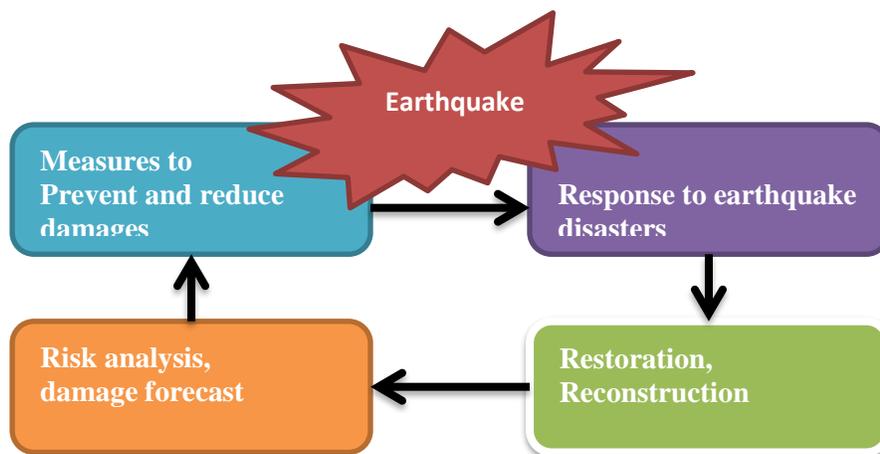


Fig. 1 Earthquake risk management cycle.

III. POST-EARTHQUAKE MEASURES

This part will focus on the response organization by defining the response phases and sequences, drawing the earthquake response incident command and specifying roles and responsibilities to be performed by all interveners in Earthquake Response Management.

3.1. Response Phases

3.1.1. Initial response

The initial phase establishes an organized response. This phase begins immediately following the occurrence of the earthquake and continues until the NCPE is fully activated and is capable of Controlling all emergency response activities.

This phase will include the issuance of EEWs and the activation of the NCPE.

3.1.2. Issuance of early warnings and alerts

Providing early warning is an important and vital action in responding to earthquakes. As earthquake strikes suddenly and speedily it is not easy to acquire and disseminate alerts for an occurring earthquake. However the earthquake hazard monitoring is mandatory to line agencies. This monitoring should lead to the methodologies of issue early warnings and alerts for earthquakes.

3.1.3. Activation of the National Contingency Plan for Earthquake (NCPE)

The Prime Minister on the NADIMAC request will activate the National Earthquake Contingency Plan for earthquake upon the issuance of Earthquake Early Warnings or after an earthquake strikes. The activation will consist on tasking involved agencies to proceed with preparedness measures implementation and to get ready and starting evacuation and other early response activities.

MINEMA and MoD will ensure that all agencies involved in earthquake response are ready and all resources available:

- Materials should be ready and in a serviceable state and response fund released to start response activities.

- Personnel from different agencies should be available and reachable. A contact list of key interveners in Earthquake Response have to be annexed on this plan

To activate the NCPE will help in preventing confusion resulting from rumors or false reports, encouraging appropriate decision-making and action-taking by transmitting correct information to both victims and the rest of the population,

3.2.Response and Incident Commanding

The response stage begins within 24 hours after the event to seven days maximum with the aim to save lives and the prevent damage to property and the environment, prompt gathering and transmission of information on the details of the earthquake, the securing of a reliable means of communication and the initial assessment of the damage caused.

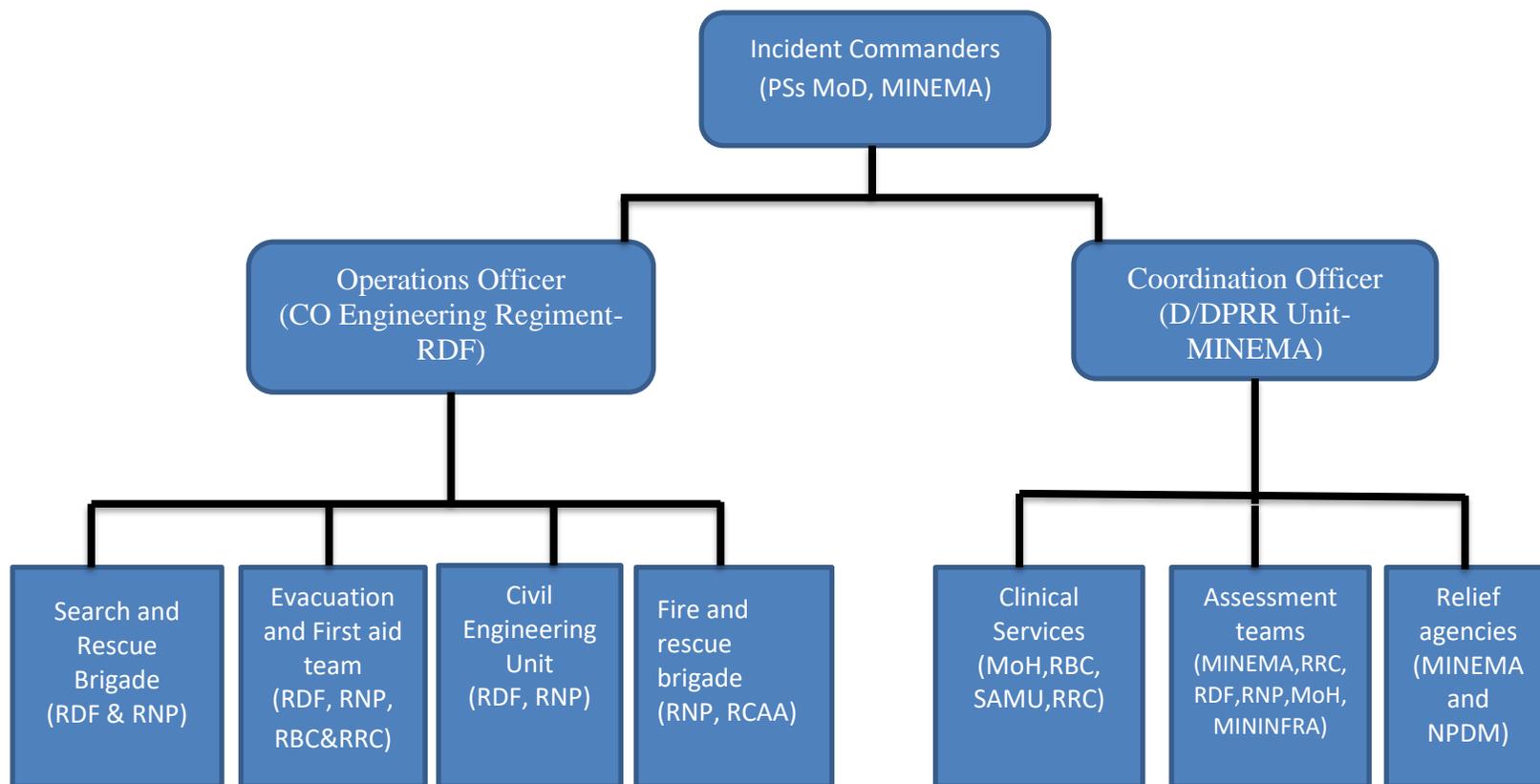
The starting of response phase will also determine the need to declare a State of Emergency or a “Disaster Area”, as appropriate and task the right agencies to carry out proper activities through an organized incident command.

The main objective of the response will be:

- Disaster prevention activities such as fire-fighting and landslides in order to prevent secondary or chain reaction emergencies
- Guiding victims to safe shelters
- Securing means of emergency transportation by controlling vehicular and pedestrian traffic to support smooth rescue, medical assistance and fire-fighting activities and to issue emergency supplies to victims
- Ascertaining the risk of secondary disasters hazards such as flooding, landslides etc., and, where necessary, evacuating residents and implementing countermeasures against these potential hazards

3.2.1. Incident command framework

Commanding response to an earthquake will follow the mentioned structure framework



3.2.2. *Incident commanding and response teams composition*

A. Search and Rescue Brigade:

- MINADEF/RDF/Engineering Regiment
- RNP/Fire and Rescue Brigade
- RRC/Disaster Management Volunteers

B. Evacuation and First Aid team

- MINADEF/RDF/Engineering Regiment
- RNP/Fire and Rescue Brigade
- MoH/SAMU & Clinical Services (Hospitals)
- RRC/Disaster Management Volunteers

C. Civil Engineering Unit

- RRC/ Disaster Management Volunteers
- MININFRA/RTDA&RHA
- Private Sector

D. Fire and Rescue Brigade

- RNP/Fire and Rescue Brigade
- RCAA Fire brigade
- Private sector

E. Clinical Services

- Hospitals
- SAMU
- WHO

F. Assessment teams

- MINEMA
- RNP/Operations
- NPDM
- Districts

G. Relief

- MINEMA
- NPDM

3.3. Roles and responsibilities during response to an earthquake incident

3.3.1. *The Incident Command*

During a response to an earthquake event the roles of the IC will be to:

- Provide policy guidance in relation to national aspirations while responding
- Facilitate the responding and coordinating agencies by providing required resources
- Advise relevant bodies in responding from an earthquake emergency
- Report to the NADIMAC members for all urgent matters and provide an advice to declare a state of emergency if necessary to competent authorities

3.3.2. *The Field Operations Officer (FOO)*

During an earthquake the RDF engineering regiment will take the lead of coordinating operations of search and rescue, evacuation and first aid and fire fighting in case of fires induced. The RDF engineering regiment commanding officer is the head of the operations commander. If he/she is not available the RDF should nominate another senior officer for the task.

The roles of the FOO will be to:

- Organize and supervise field operations of searching, rescuing and evacuating victims to safe areas
- Provide clear orders to field operations teams
- Coordinate the field workers teams

3.3.3. *Search and Rescue Brigade*

The main goal of the initial search-and-rescue period after strong earthquakes is to minimize the total number of fatalities. One important difficulty arising in this period is to find the best assignment of available resources to operational areas. For this problem a dynamic optimization model is introduced. The model uses detailed descriptions of the operational areas and of the available resources to calculate the resource performance and efficiency for different tasks related to the response. An adequate solution method for the model is presented as well.

The search and rescue brigade will work under the FOO and will be in charge of provision of aid to people who are in distress or imminent danger.

3.3.4. *First Aid Team*

This team should establish the first aid treatment areas, triage, and provide first aid to people arriving at these areas. This team will need to coordinate with the Search and Rescue Team. Team members should be certified in First Aid and Cardiopulmonary resuscitation (CPR) and should keep this certification current. Team members without training should assist in setting up the station and ensuring certified team members have the supplies they need. Assume that emergency medical personnel will be able to respond to the affected people for the first 48 hours or longer after a major earthquake.

- **Minor Care:** Have Supervision and Attendance Team handle minor care with the supplies in their emergency backpacks.
- **Triage:** Locate triage (injury sorting area) at the entry of the First Aid Station. This area is for the injured to be quickly evaluated for severity of injury and directed to the appropriate treatment area.
- **Delayed Care:** For people with injuries which do not require immediate attention within the first hour. These injuries may be lacerations, broken bones, wounds beyond a responder's

capabilities to handle, and for people needing medication. Locate near the immediate care area, but shield from the sight of the injured in immediate care area.

- **Crisis Counseling First Aid:** Mild to moderate anxiety is best handled by responders in syndicates. Severe anxiety warrants special attention in a secluded area away from other first aid areas; since the sight of injured people may worsen the hysteria. This area should also be away from the victims because hysteria is contagious and can rapidly get out of control.
- **Immediate Care:** For people with life and limb threatening injuries that require immediate attention, such as difficulty breathing, severe bleeding, major burns, and shock. Locate immediate care in an area out of sight of most people, which is also easily accessible to emergency vehicles.
- **Morgue:** Locate in an area out-of-sight of the population. This area should also be distant from the food supply and accessible by emergency vehicles. Use body bags or sheets to cover bodies being transported.
- Coordinate with the Search and Rescue Team. Provide first aid to trapped or injured as they are rescued. If necessary, assist Search and Rescue Team in providing first aid to injuries while they are trapped.
- Keep victim profile/medical release form, available in the emergency container, with each injured person. Victim profile/medical release form should include information regarding unusual medical conditions.
- Record all cases on a central log in triage. If possible, assign an extra person to serve as record keeper. All injured released from the first aid station should also be recorded in the central log, including to whom they were released and their destination. If emergency response personnel transported the injured person, note the destination of the transport. No pages should ever be removed from the central log. It is a legal document.
- A team member should routinely check the population in the evacuated area to see if anyone needs attention. If so, bring them back to the first aid station.
- Notify the Command Post of via the Safety Director the number of injuries and status of first aid treatment. Log all communications in the Triage/First Aid Crisis Communications Log.

3.3.5. Evacuation team

The evacuation team will prepare evacuation plan and conduct evacuation operations during the earthquake event. Their specific responsibilities will include:

- Provides transportation technical assistance and analysis for evacuation operations and evacuation route conditions.
- Ensure debris removal and clearance of evacuation routes.
- Provide situational awareness and coordination of mass evacuation efforts.
- Provide information and coordination required for mass evacuations, including housing and human services.
- Provide goods/services to support evacuation efforts and transportation services.
- Provide supplemental assistance to state in identifying the public health and medical needs of victims.

- Provide information and coordination for the evacuation of household pets.
- Provide support of state in public safety and security measures (e.g., crowd control, traffic direction, and control of contra flow lanes used in evacuations).
- Ensure that sufficient assets are deployed to the field to provide accurate, coordinated, and timely information to affected audiences.

3.3.6. Civil engineering unit

The civil engineering Unit from the RDF Engineering Regiment will be in charge of:

- Rehabilitation of access and evacuation roads
- Rescue people buried deep under ruins
- Reconstruction of public utilities
- Construction of temporally shelters

3.3.7. Fire and rescue brigade

Fires can immediately start and spread up to many buildings after an earthquake. Firefighting brigade should therefore be part of responding team to deal with fires in reference to firefighting contingency plan. Their main responsibilities will include:

- Detection and suppression of fires resulting from earthquake event
- Control fire burning on publicly or privately owned assets

The RNP fire brigade will be in charge of fighting and controlling fires resulting to an earthquake.

3.3.8. Humanitarian Coordination Officer (HCO)

The Director of Response and Recovery Unit in MINEMA will be the humanitarian coordinator. After the evacuation, search and rescue duties by the field Operations office, the HCO will lead the need assessment teams, the relief agencies, the health care providers and will manage the liaison office.

Specifically the role of the HCO will be to:

- Organize and supervise the event need assessment
- Work with the field operations office and ensure that the field operators are linked with humanitarian relief
- Coordinate relief agencies by defining clear responsibilities and assign to the right agencies and organizations
- Ensure that affected communities are supported and involved in relief activities
- Ensure that affected people are receiving the required health care including psychological

- Ensure that affected people received the basic support (food and nutrition, temporary shelter, security)

3.3.9. *Assessment team*

The HCO will establish the need assessment teams to evaluate the situation and determine clear actions to be done and the real support needed by victims and their direct environment to diminish suffering caused by the earthquake and allow the affected communities to start recover and return progressively to normalcy.

The need assessment team will be constituted by:

- MINEMA staffs in charge of Relief
- NADIMATEC focal point in the line institutions
- Red cross staff in charge Disaster Operations Management
- UN agencies (UNDP, WFP, WHO, UNICEF) and NGO (World Vision, Action Aid, OXFAM, ADRA, Save the Children, Trocaire, Care International) emergency coordinators

The role of the National Assessment Team (NAT) will be to:

- Create sector sub-teams (Health, sanitation, shelter, food, critical infrastructures)
- Evaluate damages
- Determine current needs to the victims
- Set response mechanisms
- Report to the high level officials and propose quick and probable actions to be taken
- Set early recovery directives

3.3.10. *Relief agencies*

A relief agency can be any organization that wants and able to provide material or technical support to the people and/or system affected by an earthquake.

The list can't therefore be exhaustive; however the areas of intervention of relief agencies during an earthquake event are limited to evacuation transport, food and nutrition, shelter, water and sanitation, alternative communications means, non-food items (clothing, utensils, hygienic kits), health care and the response technical advices).

MINEMA will design the chair within the NPDM to lead relief interventions. The roles and responsibilities of relief agencies will be:

1. **Mass Care:** Some relief agencies should provide a variety of mass care activities. Some of these activities include:
 - Identifying and setting up shelter facilities
 - Staffing shelters with skilled staff including feeders, registrars, mental health workers, and health care providers

- Distributing food and other goods to the shelters
 - Feeding disaster victims (either in the shelters or through mobile feeding units)
 - Providing temporary shelter for disaster victims
 - Providing housing for disaster relief workers
 - Rendering first aid when necessary
2. **Advocacy:** Some relief agencies work on behalf of disaster victims (particularly those with special problems such as single parent families with limited resources, the disabled, and older persons) to obtain needed resources and services (e.g., home health care, legal services, transportation, translation services, meals on wheels). Voluntary agencies may also act as advocates for change by representing the needs of the community to local and State governments.
 3. **Emergency Assistance:** Some voluntary agencies purchase and distribute basic commodities emergency assistance immediately following a disaster including food, clothing, shelter, cleaning supplies, comfort kits, first aid, and medical care.
 4. **Counseling:** Some relief agencies provide individual and family counseling and emotional support.
 5. **Damage Assessment:** Some relief agencies physically review areas affected by disaster in order to assign a value that can be used to estimate resources required for rebuilding or reconstruction.
 6. **Debris Removal:** Some voluntary agencies provide debris removal such as mucking out and cutting and clearing trees from entry ways.
 7. **Donations Management:** Many relief agencies have their own internal systems for donations management for both cash and in-kind donations. These systems address receiving, transporting, warehousing, and distributing donations during disasters. The voluntary agencies also work collaboratively with government agencies to address unsolicited donations.
 8. **Emergency Repairs:** Some voluntary agencies provide funds, staff, equipment, or tools to make emergency repairs to homes immediately following a disaster (e.g., placing tarps on roofs to avoid further damage to the home).

A. Clinical services (Hospitals and health centers)

Health operators have an important role during an emergency. Medical doctors, nurses, anesthetists and ambulances staff should play the first roles from the search and rescue phase to the latest victim's health care.

The Director General of Clinical Services in the Ministry of Health will be the health operations coordinator supported by the Director of the nearest hospital to coordinate the health workers and interveners activities. Health care cost for direct affected people should be paid from the emergency fund, therefore hospitals and health care providers will apply no bill to disaster victims.

4. CONCLUSION AND RECOMMENDATIONS

4.1. Conclusion

Emergency response support coordination, with scenario simulation based on examples of earthquake disasters as its core, has been developed. Although the aim of this coordination mechanism is to improve emergency response, it is recognized that earthquake disaster prevention technologies such as risk evaluation, damage estimation and response forecasting must be synthesized. Plans are to promote the practical application of the coordination system through the accumulation of more disaster examples and introducing greater diversification in scenario development. Suspected experience through the scenario simulation system improves emergency response ability. Emergency response scenario construction process is effective to search risk management issues.

4.2. Recommendations

The following are general recommendation for the implementations of the National Contingency Plan for Earthquake:

S/N	Recommendations	Lead Institution	Other Stakeholders
1	Put in place mechanisms for earth observation and holistic research for seismic activity, regularly monitor seismic activity and disseminate real-time earthquake related information. Increase the coverage of seismometers to ensure earthquake monitoring, surveillance and reporting of the potential risks	RMB	MINEMA, MININFRA, REG, Academia
2	Conduct risk assessment, studies and researches on earthquake (National Geo technical study, Mapping of soil type, Study on relationship between earthquake, volcanic activities and landslides in Kivu Belt region...)	RMB	MINEMA, MoE, REG Academia
4	Identify and map alternative roads/bypass roads to be used once some roads and bridges are damaged due to earthquake.	MININFRA / RTDA	NPDM, Districts
5	Identify and map resources needed for search and rescue in earthquake crisis	RDF	RNP, RTDA
6	Identify and map resources needed for relief in earthquake crisis	MINEMA	NPDM
7	Identify and map resources needed for health related activities in earthquake crisis	MoH/ SAMU	MINEMA
8	Enhance regional cooperation in earthquake activities monitoring, surveillance and development of joint-contingency plans	MINEMA	NPDM
9	Raise public awareness on seismic risks reduction and management in all Districts	MINEMA	MINALOC, Districts
10	Enhance the inspection of infrastructure to earthquake in line with earthquake laws and regulations (building codes, standards, EIAs...)	MININFRA /RHA	MINEMA/ RTDA, MINALOC, Districts
11	Strengthen the coordination of response to earthquake disaster and aftershocks effects at National level.	MINEMA	NPDM, RNP, RDF, RRC

Appendix 1: Emergency Supplies for Earthquake Preparedness

Stock up now on emergency supplies that can be used after an earthquake. These supplies should include a first aid kit, survival kits for the home, automobile, and workplace, and emergency water and food. Store enough supplies to last at least 3 days.

First Aid Kit

Store your first aid supplies in a tool box or fishing tackle box so they will be easy to carry and protected from water. Inspect your kit regularly and keep it freshly stocked. NOTE: Important medical information and most prescriptions can be stored in the refrigerator, which also provides excellent protection from fires.

Drugs/Medications

- Hydrogen peroxide to wash and disinfect wounds
- Antibiotic ointment
- Individually wrapped alcohol swabs
- Aspirin and non-aspirin tablets
- Prescriptions and any long-term medications (keep these current)
- Diarrhea medicine
- Eye drops

Dressings

- Bandage strips
- Ace bandages
- Rolled gauze
- Cotton-tipped swabs
- Adhesive tape roll

Other First Aid Supplies

- First aid book
- Scissors
- Tweezers
- Thermometer
- Bar soap
- Tissues
- Sunscreen
- Paper cups
- Pocket knife
- Small plastic bags
- Safety pins
- Needle and thread
- Instant cold packs for sprains
- Sanitary napkins
- Splinting materials

Survival Kit for Your Home

Assemble a survival kit for your home with the following items:

Tools and supplies

- ax, shovel, broom
- screwdriver, pliers, hammer, adjustable wrench
- rope for towing or rescue
- plastic sheeting and tape

Items for safety and comfort

- sturdy shoes that can provide protection from broken glass, nails, and other debris
- gloves (heavy and durable for cleaning up debris)
- candles
- waterproof matches
- change of clothing
- knife
- garden hose (for siphoning and firefighting)
- tent
- recreational supplies for children and adults
- blankets or sleeping bags
- portable radio, flashlight, and extra batteries
- essential medications and eyeglasses
- fire extinguisher -- multipurpose, dry chemical type
- food and water for pets
- toilet tissue
- cash

Survival Kit for Your Automobile

Assemble a survival kit for your automobile with the following items. Storing some of these supplies in a small bag or backpack will make them more convenient to carry if you need to walk.

- Blankets
- Bottled water
- Change of clothes
- Coins for telephone calls
- Fire extinguisher -- multipurpose, dry chemical type
- First aid kit and manual
- Emergency signal device (light sticks, battery-type flasher, reflector, etc.)
- Flashlight with fresh batteries
- Food (nonperishable -- nutrition bars, trail mix, etc.)
- Gloves
- Local map and compass
- Rope for towing, rescue, etc.
- Paper and pencils
- Premoistened towelettes
- Prescription medicines
- Battery-operated radio with fresh batteries
- Small mirror for signaling
- Toilet tissue
- Tools (pliers, adjustable wrench, screwdriver, etc.)
- Whistle for signaling
- Jumper cables
- Duct tape

Survival Kit for Your Workplace

Assemble a survival kit for the workplace with the following supplies:

- Food (nonperishable -- nutrition bars, trail mix, etc.)
- Bottled water
- Jacket or sweatshirt
- Pair of sturdy shoes
- Flashlight with fresh batteries
- Battery-operated radio with fresh batteries
- Essential medications
- Blanket
- Small first aid kit
- Extra pair of eyeglasses and/or contact lens solution
- Whistle or other signaling device

Appendix 2: Earthquake Safety checklist

An earthquake is a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes strike suddenly, without warning, and they can occur at any time of the year, day or night. Seven districts in Rwanda are at moderate to high risk of earthquakes, and they are located in the western region of the country.

Are you at increased risk from earthquakes?

- Contact your local emergency management office, local American Red Cross chapter, state geological survey or department of natural resources.
- Mobile homes and homes not attached to their foundations are at particular risk during an earthquake.
- Buildings with foundations resting on landfill and other unstable soils are at increased risk of damage.

Did you know?

Doorways are no stronger than any other part of the structure. During an earthquake, get under a sturdy piece of furniture and hold on. This will provide some protection from falling objects that can injure you during an earthquake.

How can I prepare?



- Become aware of fire evacuation and earthquake plans for all of the buildings you occupy regularly.
- Pick safe places in each room of your home, workplace and/or school. A safe place could be under a piece of furniture or against an interior wall away from windows, bookcases or tall furniture that could fall on you.
- Practice drop, cover and hold on in each safe place. If you do not have sturdy furniture to hold on to, sit on the floor next to an interior wall and cover your head and neck with your arms.
- Keep a flashlight and sturdy shoes by each person's bed.
- Make sure your home is securely anchored to its foundation.
- Bolt and brace water heaters and gas appliances to wall studs.
- Bolt bookcases, china cabinets and other tall furniture to wall studs.
- Hang heavy items, such as pictures and mirrors, away from beds, couches and anywhere people sleep or sit.
- Brace overhead light fixtures.
- Install strong latches or bolts on cabinets. Large or heavy items should be closest to the floor.
- Learn how to shut off the gas valves in your home and keep a wrench handy for that purpose.
- Learn about your area's seismic building standards and land use codes before you begin new construction.
- Keep and maintain an emergency supplies kit in an easy-to-access location.

What should I do during an earthquake?



If you are inside when the shaking starts ...

- Drop, cover and hold on. Move as little as possible.
- If you are in bed, stay there, curl up and hold on. Protect your head with a pillow.
- Stay away from windows to avoid being injured by shattered glass.
- Stay indoors until the shaking stops and you are sure it is safe to exit. If you must leave the building after the shaking stops, use stairs rather than an elevator in case there are aftershocks, power outages or other damage.
- Be aware that fire alarms and sprinkler systems frequently go off in buildings during an earthquake, even if there is no fire.

If you are outside when the shaking starts ...

- Find a clear spot and drop to the ground. Stay there until the shaking stops (away from buildings, power lines, trees, streetlights).
- If you are in a vehicle, pull over to a clear location and stop. Avoid bridges, overpasses and power lines if possible. Stay inside with your seatbelt fastened until the shaking stops. Then, drive carefully, avoiding bridges and ramps that may have been damaged.
- If a power line falls on your vehicle, do not get out. Wait for assistance.
- If you are in a mountainous area or near unstable slopes or cliffs, be alert for falling rocks and other debris. Landslides are often triggered by earthquakes.

What do I do after an earthquake?



- After an earthquake, the disaster may continue. Expect and prepare for potential aftershocks, landslides or even a tsunami. Tsunamis are often generated by earthquakes.
- Each time you feel an aftershock, drop, cover and hold on. Aftershocks frequently occur minutes, days, weeks and even months following an earthquake.
- Check yourself for injuries and get first aid, if necessary, before helping injured or trapped persons.
- Put on long pants, a long-sleeved shirt, sturdy shoes and work gloves to protect against injury from broken objects.
- Look quickly for damage in and around your home and get everyone out if your home is unsafe.
- Listen to a portable, battery-operated or hand-crank radio for updated emergency information and instructions.
- Check the telephones in your home or workplace to see if you can get a dial tone. Make brief calls to report life-threatening emergencies.
- Look for and extinguish small fires. Fire is the most common hazard after an earthquake.
- Clean up spilled medications, bleach, gasoline or other flammable liquids immediately.
- Open closet and cabinet doors carefully as contents may have shifted.
- Help people who require special assistance, such as infants, children and the elderly or disabled.
- Watch out for fallen power lines or broken gas lines and stay out of damaged areas.
- Keep animals under your direct control.
- Stay out of damaged buildings.
- If you were away from home, return only when authorities say it is safe to do so. Use extreme caution and examine walls, floors, doors, staircases and windows to check for damage.
- Be careful when driving after an earthquake and anticipate traffic light outages.

MINEMA For more information on disaster and emergency preparedness, visit www.minema.gov.rw



