



Learn to Be Resilient

1010017950 – L2BR - UCPM-2020-KN-AG

WP-5. Evaluation

Guidebook on prevention, preparedness and response in earthquakes with emphasis on pandemic circumstances with recommendations based on case studies and lessons learnt

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WP-5 | D.5.5

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1. Introduction

The main goal of L2BR project is that through set of case studies, feasibility studies, guidebooks and other activities foster intersectoral cooperation and provide useful toolbox for improvement of prevention, preparedness, and response to earthquakes in circumstances of pandemic crisis. Furthermore, project aim is to strengthen cooperation of all significant actors and enable future joint actions.

Guidebook on prevention, preparedness, and response in earthquakes with emphasis on pandemic circumstances with recommendations based on case studies and lessons learnt was planned to comprise specific operating procedures on prevention, preparedness, and response in earthquakes with emphasis on pandemic circumstances with recommendations based on Case studies (Task 2.2 and 2.3) i.e., lessons learnt from recent earthquakes in Tirana and Zagreb. Moreover, was planned to suggest improvements of existing operating procedures with emphasis on actions during pandemic circumstances related to/similar to COVID-19. Guidebook is elaborated through desk research as well as in collaboration with COO¹ and BENs².

Proper and effective disaster and emergency management in all its segments i.e., prevention, mitigation, preparedness, response, and recovery (Figure 1) is of crucial importance in saving lives, improving community resilience, promoting disaster prevention, reduces poverty, improves health, reshapes communities, strengthens security, promotes stability, protects natural resources and strengthens social contracting and trust.



Figure 1. Emergency management cycle

The Guidebook is based on suggested measures, coordination, and resource mapping in the main three segments of prevention, preparedness, and response accounting for the earthquake disaster in pandemic circumstances. Realizations of multi-hazard events are increasingly dangerous to communities as exposures permanently continue to change. Their combined effects can paralyze the mandated institutions and general public to properly react even in the countries with the most advanced disaster management systems.

¹ COO: Project Coordinator

² BENs: Project Beneficiaries

2. Guidelines input and related conclusions

2.1 Input Deliverables

The concept for the guidebook is determined on several crucial aspects developed in the frame of the project and consists of the following four key inputs given in Figure 2.

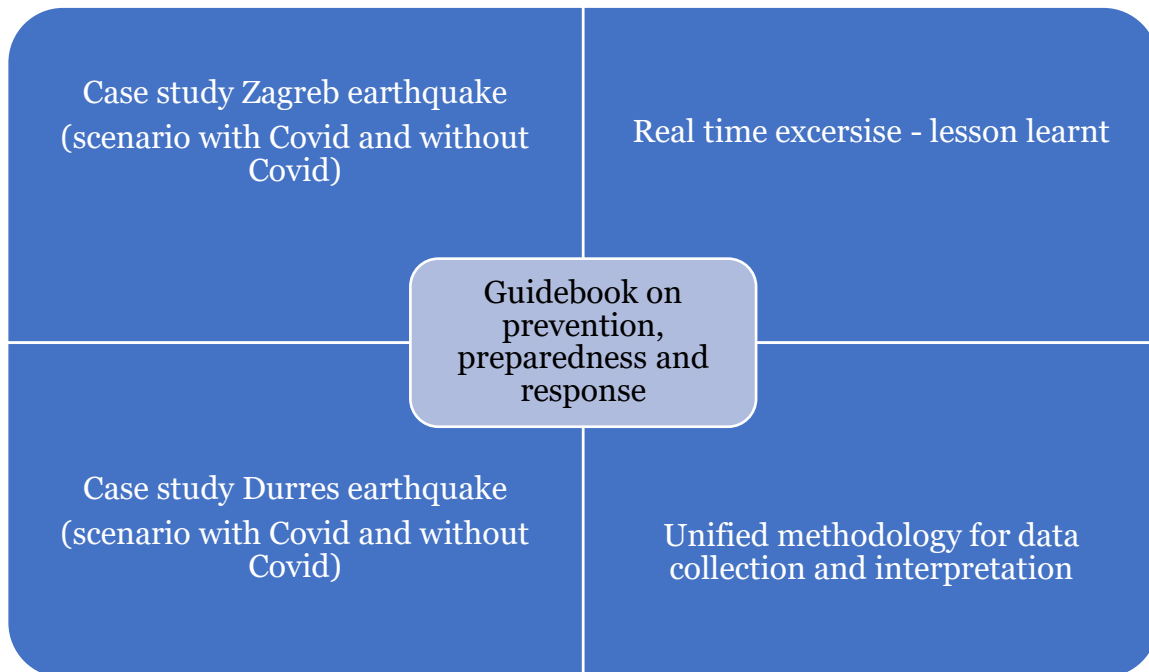


Figure 2. Four key inputs based on which the Guidebook is developed

2.2 Conclusions

Unified case study methodology is presented which was applied for the case studies in Tirana and Zagreb earthquakes. The aim of the methodology is supporting urban professionals in their disaster risk management decision-making and providing unified method for comparative analysis of selected case-studies on urban, regional, or national level. The proposed methodology describes three urban disaster risk and resilience indicator systems, developed as complementary tools to communicate risk and promote discussion around appropriate level risk and resilience strategies:

1. Urban Disaster Risk Index (UDRI) – A risk communication tool which provides a holistic view of disaster risk by capturing through indices, both the direct physical damages of buildings and infrastructure. It also considers social vulnerability and lack of resilience that can aggravate the physical effects.
2. Risk Management Index (RMI) – A risk management tool which measures a city's risk management performance, reflecting organizational, development, capacity and institutional actions taken to reduce risk, to prepare for crisis and to recover efficiently from disasters.
3. Disaster Resilience Index (DRI) – A monitoring and evaluation tool for benchmarking and measuring progress or lack thereof, along a city's key development policies and processes for mainstreaming risk reduction and increasing resilience.

The following tables present the main contribution from both Case studies as well as the real-time exercise, based on which the proposed actions on earthquake prevention, preparedness and response are given.

Table 1. Specific aspects to be analyzed in the Guidebook for Case Study Zagreb Earthquake

ZAGREB Earthquake (Deliverable 2.2)	
Major damage caused by the hazard	<ul style="list-style-type: none"> ○ Estimation of total cost: 11.3 billion EUR (10.7 destroyed physical assets, 0.6 in losses). ○ <i>Damages by sectors</i>: housing sector (64%), culture and cultural heritage sector (13%), education sector (10%), health sector (8%), and business sector (5%). ○ <i>Total losses by sectors</i>: housing sector (57%), business sector (29%), health sector (10%), culture and cultural heritage sector (3%), education sector (1%). ○ <i>In the housing sector</i>: around 24,000 damaged structures (19% moderate to severe structural damage, 5% heavy structural damage). ○ <i>In the health sector</i>: 214 affected buildings (19% moderate to severe structural damage, 4% heavy structural damage). ○ <i>In the education sector</i>: 513 damaged buildings (31% moderate to severe structural damage, 2% heavy structural damage). ○ <i>In the culture and cultural heritage sector</i>: 364 affected buildings (32% moderate to severe structural damage, 11% heavy structural damage). ○ <i>In the business sector</i>: 2,104 business affected (27% of the surface area moderate to heavy structural damage)
UDRI Index	<ul style="list-style-type: none"> ○ <i>Data collection</i> from various official sources: statistical yearbook of the City of Zagreb (2020), Health statistical yearbook of the City of Zagreb (2020), Population census (2011), Covid-19 and crime (Commentary on security indicators in the Republic of Croatia, 2020), etc. ○ Low number of fatalities (1 dead and 26 injured in total), high damaged area. ○ <i>Damaged area calculated as</i>: buildings area marked with red (unusable) and yellow (temporarily unusable), excluding those with the green tag (although with minor damage). ○ Physical risk indicator $R_F=0.1986$; Social vulnerability and lack of resilience indicators $F= 0.4074$ -> $UDRI=R_F \times (1+F)=0.28$ ○ <i>Without Covid-19 scenario</i>: it can be assumed that $F_{RF2}=0.002$ and $F_{RF3}= 0.06$ -> $UDRI=0.284$. Had the earthquake occurred during the period when Covid -19 was not present, the death and injury toll would probably have been higher.
RMI Index	<ul style="list-style-type: none"> ○ <i>Data collection</i>: Google Forms, each answer a combination of two factors: Valuation level and Confidence level.

	<ul style="list-style-type: none"> ○ Risk identification indicators RI=2.72, Risk reduction indicator RR=2.56, Capacity for disaster management indicators DM=2.71, Governance and financial protection indicators FP=2.32 -> RMI=2.58. ○ All 4 public policies assessed below the average; the public policy that had the lowest performance is the financial protection, whereas the policy with the greater performance is the risk identification.
DRI Index	<ul style="list-style-type: none"> ○ <i>Data collection</i>: Google Forms, each answer was combination of two factors: Valuation level and Confidence level. ○ Individual surveys grouped by relevant institutions: Faculty of Civil Engineering University of Zagreb, other faculties of Civil Engineering in Croatia, Ministry of Interior, Civil Protection Directorate, City Offices of the City of Zagreb, Croatian Centre for Earthquake Engineering – CCEE. ○ <i>10 indicators</i>: Effectiveness of legislative framework I₁=2.68; Effectiveness of institutional arrangements I₂=2.61; Training and capacity building I₃=2.56; Advocacy, public education and awareness I₄=2.48; Resiliency in services (shelter, health and housing) I₅=2.53; Resiliency in infrastructure I₆=2.57; Emergency management I₇=3.11; Resource management, logistics, and contingency planning I₈=2.88; Hazard, vulnerability and risk assessment I₉=2.94; Risk-Sensitive urban development and mitigation I₁₀=2.55. ○ All disaster resilience indicators are below the average.
Covid aspects	<ul style="list-style-type: none"> ○ In regard to the earthquake event, it can be said that Covid-19 saved many lives, as few people were outdoors due to restrictions, having in mind many lives might have been lost due to collapses of chimneys, gable walls, and other unsupported parts of buildings. Gatherings were banned, especially important for churches that suffered heavy damage where mass services would have been held under normal circumstances. ○ One Covid-19 aspect that was a challenge for the response measures were the closed borders and ban of movement that left many engineers and specialists from other parts of Croatia and neighboring countries unable to come and provide assistance. ○ During the assessment of damage, it was important that protective safety equipment together with masks, disposable gloves and disinfectants for Covid-19 were distributed to all first responders in the field.

	<ul style="list-style-type: none"> ○ Based on the number of cases during post-earthquake usability assessments (March to July 2020), civil engineers did not spread the infection as the number of cases stagnated, nor was there a significant increase in the number of cases as a result of the earthquake. ○ The GIS based database from the field also provided experts data on the sick and self-isolated people due to Covid 19, important regarding the safety and limiting the epidemics spread.
<p>Prevention measures before the event</p>	<ul style="list-style-type: none"> ○ Although the public safety framework in Croatia is relatively well set, its capacity to cope in an emergency/disaster of higher proportions revealed insufficient. ○ Few natural hazard risk assessment studies have been done in Croatia in 2014 and 2018, with an objective to prepare a common ground for comparison of respective risk management policies. It was recognized that Croatia lags behind countries with similar seismic settings and that it should strengthen the organization of the emergency system.
<p>Preparedness measures before the event</p>	<ul style="list-style-type: none"> ○ Recognized as a preparedness measure in this case was the acquired expertise and knowledge during activities in training and civil protection exercises within various European projects of the Zagreb Faculty of Civil Engineering, as well as participation of few experts in inspections of buildings safety following the 2019 Albania earthquake within the Croatian Platform for Disaster Risk Reduction.
<p>Response measures during the event</p>	<ul style="list-style-type: none"> ○ Immediate actions: civil protection services activated for emergency action; establishment of the Crisis headquarters for operational management at EMO; clearing up of the city center; start plan for assessment of damage and usability of affected buildings and infrastructure. ○ Assessment plan: not previously established plan at city level; technical experts self-organized under the guidance of experts from the Faculty of Civil Engineering; first actions were inspection of hospital buildings in the historic downtown; over 150 engineers volunteers on the first day. ○ Other first actions: initiation of the initial safety and usability assessment methodology at EMO, initiation of programming a mobile application (ArcGIS collector) for acquisition of field observation; training of a number of engineering experts. ○ Assessment of damage: in the first week 500 volunteers in teams of at least two structural engineers and/or

	<p>architects; visual inspection of residential buildings (more detailed for old masonry buildings and buildings with structural damage); decisions on the short-term usability in discussion between the team members and usability of critical infrastructure and essential facilities (hospitals, schools) made in agreement with the headquarters and people responsible for the institution.</p> <ul style="list-style-type: none"> ○ First objective of the assessment: identifying and implementing urgent measures for reducing potential risk of debris falling and other threats to human lives; warning people of the potential threat; restrain access to damaged buildings; data collected in the field made available to all relevant city services and governmental departments; smooth exchange of information and transparency in public media. ○ Difficulties of the site inspections: frequent double-requests for inspection on the same address; reaction of residents not familiarized with the methods of inspection, residents that choose to stay home in red-tagged buildings; shortage of protective equipment; closed borders and a ban on movement (Covid-19 measures) that left many engineers and specialists from other parts of Croatia and neighboring countries unable to come and provide assistance; etc.
<p>Recovery efforts after the event</p>	<ul style="list-style-type: none"> ○ The cost for reconstruction and recovery: 17.469 billion EUR (26% short-term needs, 41% medium-term needs, 33% long-term needs).
<p>Lessons learnt</p>	<ul style="list-style-type: none"> ○ According to the urban disaster risk and resilience indicator systems and their below the average values, it was recognized that urban resilience in Zagreb is relatively low and Croatia lags behind countries with similar seismic settings, e.g., Italy, and that it should strengthen the organization of the emergency system. ○ Few challenges were pointed: successful development and implementation of a feasible action plan for post-earthquake inspections; timely communication between the relevant institutions particularly in the first days of the post-earthquake activities; requirement for numerous adaptations of the GIS database to be able to respond to various needs. ○ The permanent communication between government and municipal representatives with citizens revealed to be important for fine adjustments of the inspection activities. ○ Awareness of the earthquake risk was extremely low, that was reflected in a number of activities at the city/state level that completely ignored or paid no attention to the potential impact of the earthquake. Procedures for post-

	<p>earthquake operations (particularly damage assessment) were not implemented in the systems at all, nor were there any official inspection forms.</p> <ul style="list-style-type: none"> ○ Databases at the city (as well as the state) level were not developed or linked, and the statistics collected in the census are not fully applicable.
<p>Major changes/improvement in disaster risk management in the city before and after the event</p>	<ul style="list-style-type: none"> ○ The Zagreb 2020 earthquake has helped identify certain gaps and needs for improvement in the response capacity and in the communication and synchronization between the state and municipal command chains. ○ In regard to the databases, after the earthquake, processes that skipped complicated administrative procedures were set in motion. ○ Other immediate changes/improvements in disaster risk management were not presented; however, many measures to be taken in the future were pointed. ○ Recommendations for future activities: <ul style="list-style-type: none"> • Focus on activities that can be achieved relatively rapidly and without significant investments (e.g., implementation of operational policies and practices as training exercises, development of methods for long-term and near-real time prediction of potential impacts and techniques for post-earthquake damage inspections). • Ultimate goal is to reduce seismic risk by identification and application of feasible retrofit strategies for older buildings and strengthening of bridges, utility systems and other essential infrastructure components. • Centralized comprehensive building and infrastructure database with linkages to the existing scattered databases and information.

Table 2. Specific aspects to be analyzed in the Guidebook for Case Study Durres Earthquake

Durres earthquake (Deliverable 2.3)	
Major damage caused by the hazard	<ul style="list-style-type: none"> ○ Extensive damage in 11 municipalities, including two most populous and developed municipalities (Tirana and Durres) ○ 51 fatalities, 913 people injured throughout the country ○ Total of 202,291 people were affected in the country, 47,263 directly and 155,029 indirectly; up to 17,000 people were displaced due to loss of their home. ○ Estimation of total cost: 985.1 mil EUR. ○ <i>Damages by sectors:</i> housing sector (78.5%), productive (8.4%), education sector (7.5%), health sector (1%), infrastructure (3.6%) and civil protection and DRR (1%). ○ <i>Total losses by sectors:</i> housing sector (24.1%), productive (56.4%), education sector (6.2%), health sector (1.4%), infrastructure (2.1%) and civil protection and DRR (9.4%), social protection (0.4%). ○ <i>In the housing sector:</i> uninhabitable 2832 buildings
UDRI Index	<ul style="list-style-type: none"> ○ <i>Data collection:</i> from various official sources: INSTAT (2022); Albanian Ministry of Health and Social Protection (2022), Population census (2011), Institute of Geosciences – Polytechnic University of Tirana, COVID and crime in 2020, Ministry of Interior, Albanian National Agency for Civil Protection, Ministry of Reconstruction, World Bank – Albanian data, expert judgement (five different groups of experts). ○ High magnitude earthquake, but 33 km away from Tirana, that has decreased the value of damages and losses. ○ Physical risk indicator $R_F=0.49$; Social vulnerability and lack of resilience indicators $F=0.90$ -> $UDRI=R_F \times (1+F)=0.93$ ○ The very high value of UDRI can be due to the fragility of many factors that increase the risk values indicators of the city. Calculations of all the parameters show a very high density of the capital on one hand and low capacity of disaster management and resilience in the country on another.
RMI Index	<ul style="list-style-type: none"> ○ <i>Data collection:</i> Tirana municipality, National institutions, literature, ongoing projects in the country on the fluid of Disaster risk reduction, civil protection, early warning system and emergency planning and recovery in the country. ○ Risk identification indicators $RI=3.05$, Risk reduction indicator $RR=2.2$, Capacity for disaster management

	<p>indicators DM=2.9, Governance and financial protection indicators FP=2.5 -> RMI=2.75.</p> <ul style="list-style-type: none"> ○ All 4 public policies assessed below the average; the public policy that had the lowest performance in Tirana is the Risk reduction, followed by the financial protection, whereas the policy with the greater performance is the risk identification, followed by the disaster management..
DRI Index	<ul style="list-style-type: none"> ○ <i>Data collection:</i> Expert judgement (five different groups of experts). ○ <i>10 indicators:</i> Effectiveness of legislative framework I₁=2.5; Effectiveness of institutional arrangements I₂=3; Training and capacity building I₃=2; Advocacy, public education, and awareness I₄=2; Resiliency in services (shelter, health, and housing) I₅=2.25; Resiliency in infrastructure I₆=2.5; Emergency management I₇=2; Resource management, logistics, and contingency planning I₈=3; Hazard, vulnerability, and risk assessment I₉=3; Risk-Sensitive urban development and mitigation I₁₀=2.5. ○ All disaster resilience indicators are below the average.
Covid aspects	<ul style="list-style-type: none"> ○ Since there was no Covid-19 present during the earthquake event in Tirana, the study of the impact of the pandemic was done separately. ○ <i>Data collection with several institutions:</i> Ministry of Health and Social Welfare, National Agency of Civil Protection, Ministry of Agriculture and Rural Development, Ministry of Tourism and Environment, Public Health Institution, National Authority of Food, State police, University of Medicine in Tirana, Agriculture University of Tirana, Health Care Services Operator ○ <i>4 scenarios for pandemic:</i> 1 - Reasonable best case scenario, 2 - Centrist-optimist, 3 - Central-pessimistic and 4 - Reasonable worst-case scenario ○ Calculated is only the RMI in Covid-19 scenario: Risk identification indicators RI=2.33, Risk reduction indicator RR=2.2, Capacity for disaster management indicators DM=2.4, Governance and financial protection indicators FP=2.4 -> RMI=2.33.
Prevention measures before the event	<ul style="list-style-type: none"> ○ No current prevention measures before the event were recognized; in the case-study future recommendations were given. ○ Low capacity of disaster management and resilience of the country was put to evidence.
Preparedness measures before the event	<ul style="list-style-type: none"> ○ The National Agency for Civil Protection is in charge for the Disaster Risk Management in the country, all the respective municipalities are constraint to prepare yearly

	<p>the Civil Protection emergency plan with a detailed analysis of the most important risks of this prefecture.</p>
<p>Response measures during the event</p>	<ul style="list-style-type: none"> ○ <i>National Response:</i> decreeing a State of Emergency by the Government of Albania (GoA) on 27th November for Durrës and Tirana and the day after for Lezha; establishment of the Inter-Ministerial Committee of Civil Emergency; preparing a detailed work program for coping with the situation; response of authorities with search and rescue operations and humanitarian aid; firefighters, civil protection, medical emergency personnel, the Armed Forces and State Reserve were immediately deployed for the initial life-saving phase ○ Albania deployed a total of 7,600 responders, including 534 volunteers and 278 specially trained Army Urban Search and Rescue (USAR) personnel. ○ <i>International Response:</i> The GoA has an existing, efficient, and well-practiced procedure for requesting international assistance that was activated on 26th November; the Albanian first responders were supported by 541 emergency personnel from twelve EU countries and 304 personnel from eight non-EU countries; additional support by international community with humanitarian supplies and institutional support; an EU Civil Protection (EUCP) Team was deployed to Albania on 27th November; ○ The UN mobilized a UNDAC team for the humanitarian phase and worked in coordination with the EUCP Team and the Albanian government on conducting a building damage assessment; the World Bank undertook a Global Rapid post-disaster Damage Estimation (GRADE) that gave a preliminary estimate of the scope and magnitude of the disaster; after the most immediate humanitarian phase the GoA requested support from the EU, the UN and the World Bank to undertake a full and comprehensive Post-Disaster Needs Assessment (PDNA) to identify the damage, losses and recovery needs arising from the event.
<p>Recovery efforts after the event</p>	<ul style="list-style-type: none"> ○ The total recovery needs: 1,076.1 billion EUR (50.7% short-term needs, 46.4% medium-term needs, 2.9% long-term needs).
<p>Lessons learnt</p>	<ul style="list-style-type: none"> ○ According to the low values of the disaster resilience indicators, the strategy aimed at development and strengthening of institutions, policies and capacities, systematic integration of risk reduction approaches into critical services and infrastructure, as well as emergency preparedness, response, and recovery need to be adopted as soon as possible.

	<ul style="list-style-type: none"> ○ The results show that the urban resilience in Tirana is relatively low and further strategic actions need to be implemented as soon as possible, as are listed above. ○ The awareness of the population in regard to earthquake risk was extremely low, which was reflected in a number of activities at the city/state level that completely ignored or paid no attention to the potential impact of the earthquake. ○ The capacities of the city (and country)) to intervene in similar disasters proved to be very low. ○ Most appropriate measures are to invest in are low measures, such as social resilience focused on the early warning and emergency preparedness. ○ The financing capacity of the country to invest in hard measures like physical or financial resilience are very limited.
<p>Major changes/improvement in disaster risk management in the city before and after the event</p>	<ul style="list-style-type: none"> ○ Immediate changes/improvements in disaster risk management were not presented; however, many measures to be taken in the future were pointed. ○ <i>Measures to be taken for better prevention/preparedness:</i> <ul style="list-style-type: none"> • Monitoring, analyzing and estimation of seismic risk: increasing the capacity of the scientific institutions, elaboration of seismic hazard studies, ensuring reliable seismological data and increasing the monitoring and maintenance of a Network of Seismographs. • Improving building standards: fully adopting the Eurocodes, improving construction quality. • Monitoring and maintaining higher stability level of supporting infrastructure (health facilities, main public buildings, roads, railways, airports, water supply systems, energy, etc.), which will be very important for the phase of managing with and recovering from a seismic shock. • Designing new buildings to withstand stronger seismic shocks than required by standard codes, cheaper investment than upgrading existing old structures. • Education for increasing awareness and knowledge related to school education programs, educations seminars for schoolteachers, briefing of citizens on the subject related to earthquake, forming and training of group of citizens. • Start of investments of to increase intervention capacities and investments in the rescue equipment and technologies for trapped persons.

	<ul style="list-style-type: none"> • Strengthening of public health from emergency to recovery by maintaining Covid-19 preparedness and response; ensuring safe delivery of health services. • Strengthening and expanding resilient and pro-poor social protection systems reducing poverty and inequality; supporting inclusive and sustainable growth by comprehensive and shock-responsive social protection system that protects people's lives and livelihoods and mitigates adverse economic consequences during the crisis and in the recovery period. • Developing a resilient economy, through increased public-sector investment in labor-intensive development schemes for job creation in sectors of high priority such as trade, agriculture, rural infrastructure development, etc. and targeted incentives packages for vulnerable productive sectors through policy, regulatory measures, and financial measures to protect and sustain private sector.
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2.3 Real time HQ exercise

Combining scientific research and real time HQ exercise was the main objective of the project with aim to support civil protection and disaster risk management actors that promote and facilitate the development, dissemination and exchange of knowledge, good practices and expertise with engagement of all relevant stakeholders (local, national, regional and international).

The aim of real time HQ exercise (Deliverable 4.1) was to test all recommendations on preparedness and response in case of earthquakes, previously defined in draft of the Guidebook (Deliverable 2.5). Through practical HQ exercise, in simulated earthquake circumstances, recommendations were planned to be additionally tested, and their efficiency proved. Within the exercise multiple disaster scenarios was planned to be used. This kind of exercise represents an excellent decision analysis tool, with aim to simulate the impact likely to result from actual disasters, to devise appropriate response strategies. While defining practical scenarios special emphasis was planned to be on earthquakes in pandemic circumstances. The HQ exercise was planned to be a helpful tool for defining final set of recommendations, based on their real-time efficiency and for development of routine operations regarding earthquake preparedness and response. Results and conclusions from the Exercise should serve as viable input for defining final Guidebook on prevention, preparedness, and response in earthquakes with emphasis on pandemic circumstances.

Detail exercise plan (Deliverable 2.7) was elaborated comprises of call for participation, participant list, agenda of the exercise, resources needed (place, logistics), description of the working points (scenarios) and all other necessary elements for smooth implementation of the real time HQ exercise. During planning special attention was planned to be given to testing of upgraded operating procedures according to Draft Guidebook (Task 2.6). In the real time exercise selected National Civil Protection Authority's teams from Croatia, Montenegro, North

Macedonia, and Albania was planned to be invited to participate. Planning was anticipated to be done through desk work and online meetings with National Authority's teams.

Two-days HQ exercise was planned to be organized in Tirana with planned participation of cca. 50 people.

In summary, full execution of the real time exercise was foreseen to be accomplished through 3 main phasis:

- Phase 1: Detailed exercises plan (D.2.7);
Draft presented on the second day of the L2BR Conference (28.10.22)
- Phase 2: Pre-Exercise coordination checkpoint (MS4);
Not implemented
- Phase 3: Real time Exercise for testing of recommendations from Guidebook on prevention, preparedness, and response in earthquakes with emphasis on pandemic circumstances (D.4.1).
Not implemented

Detailed exercise plan presented, comprised of 5 days agenda (Day 0, 1, 2, 3 and 6) with total of 14 events and injects. Together with the expected outcomes, events and injects are presented in the summary Table 3.

Table 3. Summary of events, injects, expected outcomes and learning objectives as per proposed detailed exercises plan (ref: Presentation of the representatives of Ministry of Interior of Montenegro to the Regional Conference in Tirana 27-28, October 2022).

# Day	Event	Inject	Expected Outcomes & Learning Objective(s)
0	[1] Earthquake hits... [2] Set up and activate LEMA ³	[1] Earthquake and cascading effects in pandemic [2] Managing and coordinating activities on the field in affected areas.	Local, regional and national managing and coordinating cells set up and activate. Communication, coordination and interoperability among local, regional and national structures. In this first step target audience discuss about: <ul style="list-style-type: none"> ○ What happened? ○ Set up LEMA and understanding situation? First forces are on the field? Collection of first information? ○ Management, Coordination and Communication among local, regional and national level? ○ Does Albania need International Assistance

³ LEMA: Local Earthquake Management Authority

			<p>(in kind / teams – USAR⁴, WP, Medical...)?</p> <ul style="list-style-type: none"> ○ Which bilateral agreements in the field of emergencies are exist? ○ 6) Who is responsible for sending request for international assistance?
0	<p>[3] National Operational Centre of Albania sends the Request of assistance</p> <p>[4] National Operational Centre receives offers</p> <p>[5] Collaboration with international organizations (UN⁵ agencies ...)</p>	<p>[3] Request sends of bilateral or via ERCC⁶. Needed USAR teams, drones, in kind assistance, medical and paramedical assistance</p> <p>[4] National Operational Centre sends information about acceptance of offers in terms of operational teams, in kind assistance, experts etc.</p> <p>[5] Close cooperation and exchange of data and information with UNDP⁷, UNOCHA⁸ and other international organizations in Albania</p>	<p>The target audience discuss about:</p> <ul style="list-style-type: none"> ○ How does Albania define criteria if there is need for the international assistance? ○ How does acceptable risk level influence decision make for international assistance? ○ Which procedures are in place for requesting and receiving international assistance? ○ Does Albania need to activate the Host National Support – HNS⁹ cell? ○ What are the cross border and customs procedures for bilateral assistance? ○ Preparation of a request for international (ERCC and NATO¹⁰) and bilateral assistance. ○ Official request for assistance sent to ERCC by Albanian National Operational Centre <p>Participants are encouraged to think about what will happen in case of cross border effect.</p>
1	[6] RDC & HNS cell Setup	[6] Using HNS Guidelines, procedures of sending and receiving assistance and procedures of transiting states,	<p>The target audience discuss about:</p> <ul style="list-style-type: none"> ○ Shall a RDC¹¹ be set up at the airport or where else? Are there other possibilities? Are additional RDCs needed?

⁴ USAR: Urban Search and Rescue

⁵ UN: United Nations

⁶ ERCC: Emergency Response Coordination Centre

⁷ UNDP: United Nations Development Programme

⁸ UNOCHA: United Nations Office for the coordination of Humanitarian Affairs

⁹ HNS: Host National Support

¹⁰ NATO: North Atlantic Treaty Organization

¹¹ RDC: Reception/Departure Centre

		SOPs, designate entry points and etc.	<ul style="list-style-type: none"> ○ Who shall be attached to this RDC? ○ How will the international community be informed about it? ○ How Albania informs incoming teams before their departure to Albania not to waste too much time at the border crossing/Entry Points/RDC? Are there regulations generally prepared? Is Albania providing liaison officer for the incoming teams? ○ Set up an HNS Cell as a receiving /host country for international incoming teams and equipment with HNS Registration; HNS Assistance and HNS Coordination. ○ What are the tasks of the HNS Cell? ○ International organizations shall be informed about procedures in place for transit and receiving county.
1	[7] Arriving incoming international teams	[7] Designated of liaison officers, providing escort, border crossing procedures, guideline to BoO ¹² ...	<p>The target audience discuss about:</p> <ul style="list-style-type: none"> ○ Procedures of arriving incoming teams – who is in charge for designating liaison officers, providing escort, facilitating border crossing and customs procedure? ○ Where will be set up BoO? ○ Who shall be attached to this BoO? ○ How will the international community be informed about it? ○ Safety and Security of BoO. ○ BoO manager.
1	[8] USAR in the affected areas needed	[8] Search and rescue activities in affected area, including camp management, supporting vulnerable groups.	<ul style="list-style-type: none"> ○ Discussion about what teams do exist to assess the safety of buildings in Albania? Are they experienced enough? ○ Discussion about what kind of teams will be deployed to the affected areas.

¹² BoO:

			<ul style="list-style-type: none"> ○ Testing interoperability between teams. ○ Cooperation among LEMA and UCPT¹³. ○ Testing Safety and Security procedures. ○ Where will be set up camp for displacement settlement? ○ How will the international community be informed about it? ○ Procedures for establishing camp? ○ Priorities. ○ Safety and Security of Camp. ○ Camp manager. ○ Testing procedures for acting with persons/children with disabilities and other vulnerable group.
2	<p>[9] USAR in the affected areas needed</p> <p>[10] Protection of cultural heritage</p>	<p>[9] Search and rescue activities in affected area</p> <p>[10] Assessment construction of buildings, infrastructure in protection area, coordination and cooperation with cultural heritage experts.</p>	<ul style="list-style-type: none"> ○ Discussion about what teams do exist to assess the safety of traditional architecture buildings in Albania? Are they experienced enough? ○ Discussion about what kind of teams will be deployed to the affected areas. ○ Testing interoperability between teams. ○ Cooperation among LEMA and UCPT. ○ Testing Safety and Security procedures. ○ Who will be in charge with assessment? ○ Engagement of experts for building construction and cultural heritage protection/restoration.
3	[11] Situation with covid 19 is rapidly worse.	[11] LEMA establish new measures. Provide measures to citizens and operational local and international teams.	<ul style="list-style-type: none"> ○ Safety and Security measures. ○ Health protocols. ○ How lesson learned from Zagreb earthquake are used in communicating the safety instructions in close aftermath of major event and during earthquake damage inspection?
6	[12] Time Jump	[12] Time jumps to the end of mission	Discussion stimulated between LEMA and UCPT as well as international organizations about procedures to be used to

¹³ UCPT: Union Civil Protection Team

	[13] Hand Over / take over procedures	[13] End of mission, redeployment of Teams	depart from Albania but also give information / feedback to LEMA to possibly improve existing procedures and structures.
6	[14] Post Disaster Needs Assessment – PDNA	[14] Arriving experts for PDNA	<ul style="list-style-type: none"> ○ What is Post Disaster Needs Assessment – PDNA? ○ Who will be involved in PDNA? ○ Identify the typical sectors of the PDNA, actors and their roles ○ Tools and guidelines for PDNA.

3. Proposed actions on earthquake prevention during pandemic circumstances

According to terminology published by UNDRR¹⁴, prevention is defined as activities and measures to avoid existing and new disaster risks. More broadly, prevention (i.e., disaster prevention) expresses the concept and intention to completely avoid potential adverse impacts of hazardous events. While certain disaster risks cannot be eliminated, prevention aims at reducing vulnerability and exposure in such contexts where, as a result, the risk of disaster is removed. Prevention measures can also be taken during or after a hazardous event or disaster to prevent secondary hazards or their consequences.

The Governments can contribute to the reduction of material damage and human casualties from disasters only if the actions undertaken by the government and local institutions are aimed at successfully managing disaster risks before they occur, instead of managing disasters after they occur. Therefore, the emphasis should be placed on the prevention of new risks and the reduction of existing ones, and the primary responsibility of all institutions should be in that direction, prevention of natural disasters and disasters caused by the human factor.

3.1 Prevention measures

Appropriate protection measures and actions are one of the key aspects towards lessen the severity of a disaster’s impact, especially in the specific cases of multi hazard occurrence (ex. earthquake and pandemic). Rational investment in measures that limit hazards can greatly reduce the impact of disasters.

Implemented methodology for measuring urban resilience (Khazai et al., 2015) on the selected case studies (Cities of Zagreb and Tirana), reported in D.2.2 and D2.3, through the related three indices (UDRI¹⁵, RMI¹⁶ and DRI¹⁷), suggests the following preventive measures to be reinforced, continuously implemented and monitor:

¹⁴ UNDRR: United Nations Office for Disaster Risk Reduction

¹⁵ UDRI: Urban Disaster Risk Index

¹⁶ RMI: Risk Management Index

¹⁷ DRI: Disaster Resilience Index

3.1.1. EP¹⁸ hazard and risk assessments

Assure existence of updated EP hazard and risk assessments and their mapping using state-of-the-art assessment methodologies. Apart separate assessments, multi hazard and risk assessment is required to draw and emphasize the most vulnerable zones to EP multi hazard impact. Typically, those assessments can be/are performed by specialized institutes, universities, or mandated institutions.

3.1.2. Awareness raising

Awareness about the level and probability of occurrence of EP hazard and risk starting from the mandated disaster and emergency management as well as health institutions up to general public is of crucial importance towards strengthening of emergency management prevention segment. Through this measure should be assured existence and implementation of continuous awareness raising programs for EP hazards and risks, simulation exercises, develop awareness and teaching materials, media campaigns, SOP¹⁹s and emergency plans.

For effectiveness of this measure Awareness raising strategy (ARS) should be developed, implemented, and monitored by mandated institutions specifically adjusted to different target groups.

3.1.3. Education of public to properly prepare

Proper education to public how to prepare and respond to EP hazardous event is of outmost importance towards reducing the number of victims, injured or affected people. Mandated institutions through the established ARS should identify and approach in the best and most effective way the different population target groups. Education activities should be especially strengthened in the most vulnerable groups (children, elderly, poor, chronically ill etc.). In the high EP risk zones, school curricula should be extended to accommodate the prevention measures, as well as more “aggressively” approach the other vulnerable groups through available mass and social media. Identified NGO²⁰ institutions through ARS in the frame of different programs can effectively contribute to the education and dissemination activities in this segment.

3.1.4. Monitoring and prediction systems

Nature of earthquake and pandemic hazards are of that kind that cannot be precisely forecasted, but with adequate monitoring systems/apparatus/methodologies can be in probabilistic way predicted. To assure more reliable probabilistic forecast, investment in the monitoring systems is of outmost importance. In the domain of EP hazards, investment in the appropriate state-of-the-art and dense accelerometric, seismological and SHM²¹ networks, as well as efficient pandemics monitoring platforms are goal that should be on priority list. Having reliable EP prediction assures implementation of adequate and effective protection measures in all levels. Monitoring and prediction systems can be/are part of specialized institutes, universities, or mandated institutions.

¹⁸ EP: Earthquake & Pandemics

¹⁹ SOP: Standard Operation Procedures

²⁰ NGO: Non-Governmental Organization

²¹ SHM: Structural Health Monitoring

3.1.5. Land use planning and building codes

Building i.e., structural safety in the case of an earthquake is an essential protection measure. This protection can be assured with using the latest contemporary building codes that are based on the latest knowledge and professional experience (ex. Eurocodes). Also, revision of the current land use planning based on EP hazard and risk assessment is crucial towards strengthening the overall resilience towards the EP hazard. Mandated institutions in charge of implementation of standards (ex. Standardization institutes) and spatial planning (ex. Responsible Ministries and Local Governments) should enforce the upgrades in this segment on priority basis.

3.1.6. Protection of vital and critical infrastructure

The importance of protecting vital and critical infrastructure during an EP disaster is so crucial that in direct means the difference between life and death. Critical and vital infrastructure, which comprises the systems and assets vital to a community's economy, security, education, and public health, deserves special attention. Setting up protective measures that limit damage to this infrastructure can prevent serious repercussions. Implementation of this measure is rather complex task, since includes different sectors (ex. industry, economy, security, education, health, transport, etc.) and requires permanent monitoring of the serviceability, operability, and stability. Mandated institutions in the relevant sectors should dedicate/create separate capacities (human and technical) to permanently monitor the serviceability, operability and stability of the vital and critical facilities and propose immediate measures and actions to assure their proper function.

3.1.7. Protection of cultural heritage

Last but not least, importance of protection of cultural heritage is always one of the most important segments in domain of culture since enrich social capital and create a sense of individual and collective belonging, which helps to maintain social and territorial cohesion. Protection of cultural heritage or protection of cultural goods means all measures to protect cultural property against damage, destruction, theft, embezzlement, or other loss. Typically, this measure is covered by the permanent activities of the relevant institutions (Relevant Ministries, Local Governments, Cultural Bureaus, etc. ...). In this segment of utmost importance is to be followed and implemented the latest standards that assures buildings and assets safety towards earthquake treat.

3.2. Coordination for prevention measures

For prevention to be efficient and effective, it should cover the various types of hazards and be inclusive and accessible to all citizens. The Government, which has the key, leading and coordinating role in the process, should include all stakeholders: women, children, people with special needs, people from lower social strata and senior citizens in the creation and implementation of policies, strategies, and action plans. The public and private sectors, civil society organizations, academic, scientific and research institutions, and the business sector should also be involved here in order to integrate disaster prevention in their management.

Coordination for prevention measures is rather complex task which requires proper planning, implementation, and monitoring of implemented measures and actions. Coordination typically relies on developed so called National platform document and is realized through the mandated institution (ex. National coordinator for the implementation of the national

platform for reducing the risks of accidents and disasters). The National Platform for Disaster Risk Reduction is a document that systematically encourages and obliges the subjects of the crisis management, protection, and rescue system to act in a much more organized and effective way for early warning, prevention, reduction, and remediation of the consequences of possible disasters. Priority should be given to the organization of the system for action in crisis conditions, institutional capacities, regional and international cooperation, as well as defining and concretizing the priority obligations of state institutions, mobilizing the public, the non-governmental sector, the expert and professional public in building the system for protection and increase of its operability, efficiency, and effectiveness.

A clear vision, plan, guidelines, coordination, and active participation of all stakeholders is needed for efficient and effective disaster management. In that direction, each country should prepare and implement a strategy and action plan for disaster risk reduction, with specific time frames, goals and tasks aimed at preventing the creation of risks, reducing existing risks and strengthening the resilience of society.

3.3. Resource mapping

All governmental institutions, public enterprises, companies, and other entities have legal and social obligations in their actions, but it is necessary for this system to be constantly developed and upgraded. The effectiveness of the DRR²² system is the core of national disaster risk reduction platforms. Only well-organized institutions, with specifically defined obligations and preparedness of the institutions, are a guarantee for successful prevention, early warning, and reduction of the consequences of disasters.

It is necessary to prepare a legal solution that will generate a single state body that will establish a single system for crisis management, protection and rescue and integrating the available capacities and resources at all administrative levels, as well as a comprehensive approach for a more efficient and effective reduction of the risks of disasters. The legal solution will open up the need for amendments and additions to other existing laws that regulate aspects of the system, all in order to specify the role of the various institutions and bodies. Strengthening society's resilience against disasters is a crucial issue that all entities of the crisis system must work on.

4. Proposed actions on earthquake preparedness during pandemic circumstances

Following the terminology given by UNDRR, preparedness refers to the knowledge and capacities developed by governments, response and recovery organizations, communities, and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent or current disasters. This points out to which resources that might be necessary and highlights that preparedness may be viewed from different perspectives:

- Personal preparedness. A person's or a household's preparedness for handling a certain type of event.
- Organizational preparedness. A response organization, e.g. the police, might be interested in the preparedness for helping people, while a company may have their own preparedness for dealing with disasters, emergencies, or economic crises.

²² DRR: Disaster Risk Reduction

- Society preparedness. On a larger scale, society preparedness can be a nation's ability to handle a major disaster, i.e. national disaster preparedness. On a regional scale, it may be a measure of how the region, e.g. a county or a municipality, is organized to ensure the safety and security of its inhabitants in case of accidents.

However, coordinated action is essential when preparing for a disaster. This includes the development of plans or arrangements based on risk assessments and spans the full spectrum of disaster management phases: prevention, preparedness, response and recovery.

Effective disaster management planning for all hazards is a key element of being prepared as it allows all disaster management stakeholders to understand their roles, responsibilities, capability, and capacity when responding to an event.

4.1 Preparedness measures

Preparedness measures can require diverse community involvement, from architects to engineers and teachers presenting post-disaster safety evaluation classes; to earth scientists providing seminars on national/regional seismic hazards; to engineers performing earthquake assessments, developing building code provisions, and implementing seismic safety requirements through national building codes. It also includes emergency managers and public officials organizing and preparing communities for an inevitable future earthquake. In addition, conducting the earthquake drill, collecting the equipment for response and monitoring, and updating the implementation of activities are also included in the preparedness measures.

4.1.1 Public education and awareness

Public education and awareness-raising prior to any hazard event is essential. Ideally, on-going public awareness and education activities on disaster preparedness should be built into school curricula from primary schools to university. Public education and awareness raising activities should provide clear information on hazards, vulnerabilities, risks, and how to reduce disaster impacts to vulnerable communities and decision-makers. They should also provide community education on how warnings will be disseminated and on how to respond to different types of hazards after an early warning message is received. Utilizing mass media and folk or alternative media to improve public awareness can also be effective in this regard. In addition, public awareness and education campaigns should be tailored to the specific needs of each target group (e.g. children, emergency managers, media). Public awareness strategies and programs should be reviewed at least once per year (so that they can be updated as required).

4.1.2 Land-use planning

Land-use planning requires detailed study of earthquake scenarios that outline the most vulnerable areas. Approval of building permits in earthquake prone states/regions shall be rigorous, ensuring that all design parameters are met to ensure earthquake resistant buildings. Farming practices along hilly areas should be controlled to prevent instability caused by possible landslides in the event of an earthquake. Open spaces and parks should be delineated; these could be used as playgrounds and, during an emergency, as shelter hubs.

4.1.3 Contingency planning

Contingency planning is necessary to analyze the impact of potential hazard events so that adequate and appropriate arrangements are made in advance to respond in a timely, effective, and appropriate way to the needs of the affected population(s). Contingency planning is a tool to anticipate, pre-empt, and solve problems that typically occur. A well-developed and

consistently updated contingency plan is an essential element of an overall national preparedness capability. Contingency plans should be clear, accessible, and concise; readable in one sitting, otherwise the reader risks becoming lost in the detail. A national contingency plan should be . Sectoral, Ministry or humanitarian agencies plans can be attached as annexes. The organization tasked with disaster management is best placed to lead or coordinate a national contingency planning process although all key stakeholders should be included. Before developing a contingency plan, an analysis of existing emergency plans and procedures, resource and equipment inventories, training records and reviews of past disaster experiences and lessons learned in research studies and reports should be undertaken.

4.1.4 Implementation

Once the planning process has been completed, it is essential that its content be used to directly increase levels of readiness through activities such as upgrading early warning systems, pre-positioning resources within sectors likely to be impacted, or the provision of contingency budgets for associated government departments with central responsibilities for preparedness. It is also important that sufficient resources are allocated for the review and dissemination of the plan by all of those who are expected to play a role in its implementation. Also classroom or actual field simulation exercises, based on specific scenarios, are an effective means to determine how realistic the plan is and to assess the capacity of the different actors. Simulation and response exercises can help to identify strengths and weaknesses, as well as what training is required so that all participants are able to meet their identified responsibilities. The use of simulation exercises also serves to maintain the plan ‘fresh’ in the minds of all the actors and to keep knowledge and skills up to date. It is vital that all clearly understand the plan and their role and responsibilities.

4.1.5 Hazard monitoring and early warning system

An effective national and regional early warning system that applies sound scientific information and risk knowledge and is able to communicate warnings to mobilize action in all at-risk communities is essential. Early warning allows the public and emergency responders to take pre-emptive and protective action to avoid harm. Early warning should trigger action by designated agencies or community members to prepare for a hazard event and/or assist the evacuation in an area at risk. At a minimum, as part of the national preparedness capability, disaster authorities should be linked to the meteorological and seismic monitoring departments both nationally and regionally, and to key government or academic institutions that consistently track disaster trends. Depending on the hazard type, community-based monitoring mechanisms may be able to monitor changes at the local level. These need to be developed and strengthened by providing support to the development of early warning indicators at community level. Ongoing dialogue with the scientific and technological communities is crucial, as well as improved data sharing.

National institutional arrangements for preparedness should clearly designate who can authorize the release of warnings to the public, what organizations should be notified, and the procedures to be followed. Standard warning formats and elements should be prepared in advance, and appropriate means or systems for issuing the warning should be determined, based on the nature of the imminent hazard event. These systems should be consistent for all hazards.

It is imperative that preparedness and warning systems are designed to reach the entire population, including seasonal populations and remote locations.

4.1.6 Information Management and communication

An information management and dissemination system that facilitates the two-way exchange of pertinent technical and management information between internal and external stakeholders needs to be developed and maintained. The communication of accurate, timely, and useful information and instructions to the public is necessary throughout a disaster, not only during the early-warning period. In addition, it is essential that a disaster preparedness capability continually collects and analyses information for its own use, so that it can make sure that humanitarian needs are met and can learn from its experiences.

4.1.7 Stockpiling goods for response

Once a major earthquake strikes, it is anticipated that lifelines, such as electricity and water, will be damaged, and the supply of goods will be interrupted. Stockpiles of water, food, first aid kits, sanitary napkins, and other basic items will be essential. Non-perishable items should be stored more than the amount re-quired on a day-to-day basis. People who live in earthquake-prone areas are encouraged to have an earthquake emergency kit or earthquake survival kit. A government emergency management plan for the workplace and emergency supplies for earthquake preparedness shall be in place.

4.1.8 Preparing the inside of the home/office

In recent years, 30-50 per cent of earthquake-related injuries were caused by falling objects or furniture and other heavy items toppling over or sliding into people. The best approach is to arrange furniture so that one will not be crushed by it. Stabilizing devices can prevent items such as glasses from shattering. It is important not to have objects blocking doorways - keep furniture to a minimum; keep the escape routes clear, secure computers to desks and walls and store items in shelves; and learn how to turn off the gas and the main electric circuit. Prevent outbreaks of fire and stop its spread by installing fire extinguishers, fire alarm systems, and ground fault circuit interrupters for home/office use.

4.1.9 Preparing the outside of the home/office

To evacuate safely during an earthquake, it is essential to know the situation around one's house/office and understand the level of risk at the community levels. It is also important to check the evacuation routes and practice walking through them.

4.2. Coordination for preparedness measures

Coordination is a fundamental component of this plan, which seeks to ensure that activities are implemented without any duplications, among the union level, union and sub national, Disaster Risk Reduction Working Group (DRR WG), private sector, Civil Society Organizations (CSOs) and Non-Government Organizations (NGOs), ASEAN, bilateral organizations and civil military cooperation.

4.2.1 Union level coordination

All Ministries and departments shall allocate a budget for disaster preparedness and use such resources when a disaster strikes, in addition to the contingency plan and other sources of funding. Other financing mechanisms, such as risk-financing/insurance, shall also be agreed in advance, to compliment the government resources during any disaster. Those resources are allocated for implementation of the planned activities. Each Ministry shall ensure that their annual plan is disaster risk-informed, including earthquakes. It is also a requirement that each ministry has a disaster preparedness and evacuation plan (mostly for earthquakes and fire) and regularly conducts drills to correct

lapses in preparedness for future disasters. If necessary, it would be required to ask for support from technical institutions. A report on such ministerial level simulation/drills shall be shared with NDMC (National Disaster Management Committees) through NDMC work committees.

4.2.2 Union level and DRR WG coordination

The mandate of DRR WG is to always provide support to the government's development agenda. Core areas shall include but are not limited to:

- 1) Research and gain an understanding of earthquake risks and ensure such information is available to the government and partners for seismic hazards abatement;
- 2) Mapping of available resources: DRR WG team members' location, contacts, and counterpart Ministry /Departments;
- 3) Comprehensive stock list of partners' priority relief item stock: food and non-food, including domestic items, WASH (water and sanitation and hygiene), shelter, hygiene and dignity kits; composition of relief assistance packages.
- 4) Rapid assessment
- 5) Information sharing across sectors and at the national and sub-national and community levels;
- 6) Support the government in policy development and implementation (e.g. Codes and Earthquake Resilient Strategy);
- 7) Inter-agency and inter-sectoral preparedness workshops/seminars and drills, including training with local government officials; and
- 8) Identifying rapid response teams and surge capacity (regional and global).

The focal organization from DRR WG shall be the focal point who will inform NDMC about DRR WG activities planned for the year, focusing on earthquake preparedness. The focal organization shall ensure that monitoring systems are in place for NDMC to track implementation of activities and conduct a final evaluation.

4.2.3 Union level and private sector coordination

Areas where the private sector could collaborate include, but are not limited to:

- 1) Identifying and promoting preparedness activities at national, sub-national, and community levels;
- 2) Collaboration on awareness raising programs for earthquake hazard preparedness;
- 3) Dissemination of information to communities at risk;
- 4) Cooperation in developing evacuation plans and performing regular simulation exercises; and
- 5) Support to obtain relevant data for National level earthquake resilience initiatives.

Additionally, each private sector is encouraged to have disaster preparedness and evacuation plans and to conduct regular exercises for their staff to raise awareness on the dos and don'ts.

4.2.4 Civil military coordination

Preparing for any disaster requires collaboration by those that have a stake, not only for the preparedness part, but also during the response. This requires planning and working together

to understand each other's skills before the event. Thus, to ensure fruitful working relationships in preparedness, the military shall:

- 1) Appoint the contact team/relevant department by the Ministry of Defense;
- 2) Participate in civil training programs on disaster risk reduction;
- 3) Play a role in simulation exercises (i.e. testing operation procedures, search, and rescue operations, etc.) that are organized in the country at various levels;
- 4) Allow access to their resources in terms of heavy equipment, sniffer dogs, etc.;
- 5) State/region DMCs shall coordinate with the state/region military office on earthquake preparedness - coordination shall be through planning and executing the plan together;
- 6) Ensure that newly trained officers are equipped with the dos and don'ts of earthquakes;
- 7) Collect the resources for response such as human resources, equipment, machine, fuel, and rations etc.

4.2.5 Union level and CSO/NGO coordination

CSOs and NGOs are mostly engaged at the community level, and work with some of the most vulnerable groups in relation to the impact of natural disasters. Focal persons from these organizations shall coordinate with relevant departments at the district/township levels on planned activities that relate to earthquake preparedness. The organizations shall present their annual work plan including project area map to NDMC or the relevant department prior to implementation, to allow effective coordination and monitoring of activities. The organization shall also share a list to NDMC of their technical expertise, such as mapping, research work and resources.

4.3 Resource mapping for preparedness

Resource mapping requires an assessment of current systems and resources. The assessment should consider available resources, existing capacities, operational plans, and procedures, as well as communications and coordination systems at every level in order to identify gaps and capacity building needs and to plan accordingly. It should look at all phases of an emergency, including preparedness and response and early-recovery.

Governments: An inter-agency, multi-sectoral capacity assessment should be completed resulting in clear measurable actions to strengthen and maintain preparedness capacity. Appropriate ongoing training programs, including simulation exercises should be developed and implemented at the national, provincial, and local levels. Funding for institutional capacity building and technical training should be included in budgets and available in a consistent and timely manner.

Civil Society: Civil society stakeholders participate in the capacity assessment process. Civil society stakeholders and communities receive adequate training and other support to be able to fulfil their roles within the preparedness system. Universities, specialized technical agencies, and disaster preparedness organizations are involved in capacity building initiatives for disaster preparedness.

Regional Organizations: Training materials and courses are provided to Member States and other stakeholders to increase regional capacity in disaster preparedness and response. Regional training and capacity standards should be disseminated throughout the region.

International Actors: Lessons learned, and good case studies should be collected and shared with other countries.

5. Proposed actions on earthquake response during pandemic circumstances

According to ISDR, 2007 Response is the provision of assistance or intervention during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected. It can be of an immediate, short-term, or protracted duration. (ISDR 2007). Response is directly associated with the level of Preparedness. Strengthened preparedness for response in disasters is concerned mainly with two objectives: 1) increasing the capacity to predict, monitor and reduce or avoid possible damage or addressing potential threats and 2) strengthening preparedness for response to a disaster or assist those who have been adversely affected.

After a major earthquake the following can be expected:

- structural damages due to ground shaking;
- thousands of injuries and deaths;
- the disruption of basic services such as health care, communication, water supply and power supply;
- secondary hazards, such as fire, landslides and aftershocks will occur.

In each of these situations, the National Body for Disaster management work committees shall operate response activities in affected areas in collaboration with stakeholders.

Table 4 suggests the main aspects in response during pandemic circumstances based on previous case studies and the Tirana and Zagreb earthquakes (Modified by Mavroulis et al. (2021).

Table 4. Response activities specifics for pandemic conditions

Pre pandemic era	Pandemic aspects	Earthquake pandemic aspects
Operations coordination centers in indoor sites specially designed for accommodating many people for many hours of coordinating response actions	The involved staff should avoid overcrowding The involved staff should maintain physical distancing	Set up operations coordination centers outdoors in places with continuous ventilation and area for maintaining physical distancing
Residents should accommodate in emergency shelters	Residents should avoid overcrowding Residents should maintain physical distancing	Increasing number of emergency shelters Using different types of structures
National Civil Protection staff go to the earthquake-affected area	Movements into or out of municipalities and regional units with different viral loads and infection rates are restricted	Mandatory use of personal preventive measures comprising mandatory use of face mask indoors and outdoors, regular hand washing, disinfection of tools, equipment and surfaces
Search and rescue operations	Rescuers should maintain physical distancing	Mandatory use of personal preventive measures
Distribution of emergency supplies in emergency shelters with bare hands	Avoiding sharing items	Wearing masks and disposable gloves during the preparation and distribution process
In-person psychological support and counselling sessions	Specialized staff and affected people in need of support should maintain physical distancing	Remote communication via teleconference or videoconference
Awareness and education activities on the earthquake effects in indoor sites specially designed for accommodating many people for many hours	Participants should avoid overcrowding Participants should maintain physical distancing	Awareness and education activities on the earthquake and the COVID-19 pandemic effects outdoors in places with continuous ventilation and area for maintaining physical distancing

5.1 Response measures

Emergency search and rescue activities shall be carried out for people trapped in the buildings, when evacuation difficulties arise, if there are injuries caused by glass; and other situations where there are damaged materials. In addition, safe evacuation places and shelters shall be operated for affected people and those who need medical assistance. Alternate transportation systems shall be put in place if the injuries required individuals to be relocated to another hospital for better medical treatment. The necessary resources for debris removal shall be received as per prior discussion. Firefighting equipment shall be prepared in case of fire as the earthquake could trigger the immediate, simultaneous ignition of fire.

General Precautions to the staff directly involved in the response team are given:

- Only trained personnel should be involved in search and rescue or demolition and cleanup operations.
- Continue to monitor your local radio or television stations for emergency information.
- Be aware of possible structural, electrical, or gas-leak hazards.
- If such hazards are identified, report them to the proper local authorities and/or utility.
- Do not touch downed overhead lines or objects in contact with downed power lines.
- Wear proper protective clothing when walking on or near debris, including boots and gloves.
- Be careful around sharp objects, including nails and broken glass.
- Use the proper safety precautions when operating generators, chainsaws, or other power tools.
- Take steps to prevent cold injuries or heat illnesses and dehydration.
- Avoid contact with wild or stray animals.

A multi-hazard approach can improve effectiveness. A particular community is usually exposed to risk from a variety of hazards. The resulting cumulative risk cannot be tackled effectively if actors plan merely for selected hazardous events. A multi-hazard approach involves translating and linking knowledge of a full range of hazards into disaster and risk management. It will look not only at natural hazards, but also factors including political strategies, technical analysis, and operational capabilities and public understanding. This approach will ultimately lead to greater effectiveness and cost efficiency.

5.2. Coordination for response measures

A major earthquake disaster that triggers a disaster declaration shall necessitate coordination with government from the union level and other states and regions, military, Humanitarian Aid, the private sector, and the European Union region to address the needs of the affected persons. Assistance shall be needed to fill the gap of the region's resources and aid resources may be available from other states and regions, or from humanitarian partners. At each level of the response, coordination is critical to avoid duplication, rapid responses, and to ensure specific targeting of needs.

5.2.1 Union level coordination

National Disaster management work committees (NDMC) shall coordinate to identify the priorities and response action for the affected region. Coordination is crucial in rapid response and is consisted of several important flow of coordination.

5.2.2 Union level and state/region coordination

Following the declaration of a disaster, National Disaster Management work committees shall provide support to their respective work committees, deployed to the affected state/region. In the affected region, the Disaster Region Committees (DMC) shall commence the response activities under the guidance of the Chair of the region disaster management committee until the NDMC work committee arrives. The response activities shall be updated to NDMC through region DMCs for necessary assistance. Moreover, region DMCs shall coordinate with NDMC work committees in respective sectors for implementation of the response activities, other necessary support and to identify the priorities.

5.2.3 Union level and HCT coordination

Following the declaration of an earthquake disaster, the HCT shall coordinate the humanitarian needs. The focal person from HCT {the Humanitarian Coordinator (HC) or the Resident Coordinator of the UN (in a country where there is no HC) or designee shall ensure that staff work with the respective work committees in accordance to their areas of expertise. For example, support the work committees for the initial needs assessment and emergency needs assessment. The HCT has a contingency plan to provide immediate life-saving support following a disaster. Within the contingency plan, agencies will usually earmark their resource capabilities and allocate the resources after the disaster has been declared.

5.2.4 Union level and private sector coordination

The necessary resources for response include airlines which can be used to transport responders and victims; media stations that could be used to broadcast appropriate information to the public; and heavy machinery which can be used to clean the debris and demolish the damaged buildings.

A prior agreement during the preparedness stage will enable the immediate deployment of resources. Where such an agreement is not made prior to the disaster, a special agreement shall be made between the relevant work committees from NDMC and the private owner to allow immediate use of the resources.

5.2.5 Union level and Civil Society Organizations CSO, Non-governmental Organizations NGO coordination

CSOs and NGOs shall be integrated into respective work committees. These entities shall appoint a focal person who shall liaise closely with the Chair of the work committees and relevant region DMCs in their areas of interest for integration. Any response on the ground shall be channeled through the work committees. Voluntary organizations that request to be part of the response team shall be coordinated by the respective work committees.

5.2.6 Union level and European Union level

In the event of a severe earthquake, where national resources are exhausted, the government, through the Minister of Foreign Affairs, Chair of the International Relations Work Committee or DDM, and the Ministry of Social Welfare, shall request support from European Union countries. Such support shall be informed by the needs of the work committees. Entry into the country may require security or visa clearance; all clearance shall be taken care of by the International Relations Work Committee. Likewise, where victims are expected to be flown out of the country for treatment, clearance shall be arranged through the Foreign Ministry in coordination with the Health Care Work Committee.

5.2.7 Civil military coordination

The military usually has heavy duty equipment - such as bulldozers, cranes, etc. suitable for debris clearance following an earthquake and are well trained in handling such equipment. They are also specialized in various fields such as construction, medicine and first aid. Where they are called upon to support the responses, they shall work together with the Search and Rescue Work Committee and outreach teams and shall be coordinated by the respective work committee. Security for the response shall be the responsibility of the Security Work Committee.

5.2.8 Union level and bilateral agencies coordination

If there is support and aid from international agencies through relevant Embassies, Counsellor Offices and international institutions, the Ministry of Foreign Affairs shall coordinate with relevant work committees. The support shall be distributed to the victims through relevant work committees and local organizations and will be recorded.

5.3. Resource mapping

For each specific resources included in the response activities the following particular operation procedures are recommended:

Governments:

- Response activities utilize national preparedness capabilities and adhere to or exceed SPHERE Minimum Standards for Disaster Relief. The SPHERE minimum standards cover four primary life-saving areas of humanitarian aid: water supply, sanitation, and hygiene promotion; food security and nutrition; shelter, settlement and non-food items; and health action.
- An Emergency Operations Centre or equivalent should be established and tested.
- Hazard damage assessment mechanisms should be defined and tested and assessment teams to be trained on how to use tools appropriately.
- Response projects should include specific provisions to promote gender equity and to enable vulnerable populations to receive additional support.
- Response simulations exercises need to be held to test and improve response capacities, and staff and communities to receive training to enable them to perform their duties in an emergency response.
- Mechanisms to fund emergency response activities should take place.

- Agreements should be signed with international or other response providers in advance, enabling them to provide additional assistance if requested and required.
- Procedures should take place to document experiences during hazard events and disasters to assist post-disaster reviews.

Civil Society:

- Personnel/ volunteers to be trained in their areas of responsibility and be equipped to respond at the local level.
- Regional Organizations: Support to States to ensure that legislation and response mechanisms are applicable to emergencies that may cross national borders provided.
- Support to States in developing regional response disaster cooperation agreements should be provided.

International Actors:

- Technical support to the State and other actors in disaster response including support for the application of applicable international law and adherence to SPHERE standards provided.
- Mechanisms should take in place to coordination of external responders and internal appeals for funding if requested and required.

6. Conclusions

This Guidebook comprises of specific operating procedures on prevention, preparedness, and response in earthquakes with emphasis on pandemic circumstances with recommendations based on Case studies i.e. lessons learnt from recent earthquakes in Tirana and Zagreb. Moreover, it suggests improvements of existing operating procedures with emphasis on actions during pandemic circumstances related to/similar to COVID-19. Guidebook was elaborated through desk research as well as in collaboration with COO and BENs.

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