



## **EARTHQUAKE RISK MITIGATION AND PREPAREDNESS COMMUNICATION POLICIES TO BRIDGE THE GAP BETWEEN PUBLIC MISCONCEPTIONS AND PROPER ACTIONS**

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### **ABSTRACT**

Greece is a country highly vulnerable to earthquakes. Lessons learned from recent earthquake disasters have shown that preparedness and prevention are key tools to minimize the impact in human and economical resources of such disasters. Prevention and pre-disaster mitigation steps are necessary for achieving sustainable development.

The present study in a form of a questionnaire survey, aims to 1) investigate public's levels of awareness and preparedness on earthquake protection actions 2) identify the existing gaps and 3) present the earthquake risk mitigation communication policies that have been done in Greece, in order to bridge the identified gaps.

According to the results a significant majority of the responders were being familiar with the standardized procedures that include prevention and protection behaviors on earthquake protection issues, as well as response and mitigation actions at individual, family and workplace level. Concerning the school environment, results revealed the effectiveness of emergency management/response of school community in an event of an earthquake.

### **INTRODUCTION**

Numerous geodynamic hazards affect many parts of Europe every year. Mediterranean is one of the most active regions of the Earth. It's estimated that today, a 50% of the annual seismic energy in Europe and a 2% of the annual world seismic energy, is released in Greece. Owing to its geographical location Greece witnessed destructive earthquakes which caused property and human losses.

Lessons learned from recent earthquake disasters have shown that preparedness and prevention are key tools to minimize the impact in human and economical resources of such disasters. "An earthquake is an event that can be prepared for in advance" (Turner, 1976).

Particularly, in earthquake prone countries, a continuous update and education of the public on earthquake risk issues is essential (UN/ISDR 2005). If the risk of disaster can be assessed and addressed before it occurs then we can greatly limit the effects on vulnerable communities – such as physical damage, injury and loss of life. Reducing the impact of disasters is crucial to meet the growing demands of future emergencies. This should be expanded to different levels from school to homes and then to communities.

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Earthquake preparedness planning should aim at developing a “Safety Culture” in which citizens are aware of the hazards which threaten them and provides the knowledge with which people can protect themselves. Earthquake prevention and pre-disaster mitigation are necessary steps for achieving sustainable development.

## **OBJECTIVE - METHODOLOGY**

In Greece, State’s current efforts aim to raise awareness of the population, improve its knowledge on earthquakes, educate relevant target groups and build a disaster prevention culture. Earthquake Planning and Protection Organization (E.P.P.O.), that is a State Organization and the competent authority in Greece to process and design the national policy on earthquake protection, contributes in the development of seismic safety culture and resilience through public awareness projects addressed to teachers, public servants, students, volunteers, people with disabilities, tourists etc. (Kourou et al., 2010).

EPPO educational project is focused on the following issues:

- Increasing preparedness of children. Children understand the concepts of disaster risk reduction and are capable of and active in taking action in disaster risk reduction programmes within their family, school and community. To achieve that goal EPPO develops educational leaflets and mobile experiential educational material for students and implements specific projects connected with school curricula.
- Increasing preparedness of adults: Adults in target family, work and community are aware of and knowledgeable about the risks of earthquakes and, with the involvement of children, have taken action to protect their households, work places and communities against earthquake disasters. A sustainable disaster management working procedure is in place which includes elaboration of E.P.P.O.’s several projects for different target groups.
- Improving skills of specific target groups responsible for emergency management: EPPO working towards a national framework for seismic risk reduction, throughout the education sector, adapting standard operating procedures for earthquake events.

The objectives of EPPO educational actions are: 1) to study and analyze the needs of each target group 2) to identify, share and implement best practices and methodologies gained from previous experiences 3) to develop and realize innovative initiatives and actions aiming to raise awareness and increase knowledge of public on earthquake hazards 4) to empower people to prepare for, react to, and recover from disasters and adapt to long term trends 5) to train teachers, parents or other relative groups to be able to contribute to children palliation in case of earthquake and help them cope in case of a serious earthquake event and 6) to disseminate and share its results and outcomes to potential beneficiaries and broader audience on a constant base.

The aim of the present study is to assess public’s levels of awareness and preparedness on earthquake protection actions, evaluate the current knowledge of risk mitigation behaviors, identify the existing gaps and finally present the earthquake risk mitigation communication policies that have been done in order to bridge the identified gaps.

In that framework the past two years, specific questionnaires were developed and were administered to school teachers who were responsible for the preparation of their School Emergency Preparedness Plans. The sample of the research comprises all the primary and secondary schools, of 20 out of 74 different prefectures of Greece that is approximately one third of main prefectures of the country. A questionnaire of 15 questions developed by the researchers, was used to hold the views of the subjects. The following areas were assessed: knowledge of the appropriate responses in the event of an earthquake, actual preparedness and mitigation measures that have been already taken, previous experience of an earthquake and preferable sources of information seeking. In total, 1.587 responses have been gathered and analyzed.

## SEISMIC SAFETY AT HOME

It is generally accepted that risk reduction and resilience education should be designed to develop a culture of safety and resilient families and communities.

In Greece key responsibilities are to develop consensus-based key messages for reducing household, work place and community vulnerabilities, and for preparing for and responding to hazard impacts, and also to engage the general population in real-life family and community disaster management activities, including drills for earthquake event. Simultaneously priority actions are to reduce the risk factors for people with disabilities, to develop a safe environment for tourists and to develop strategies to scale-up citizens, services and local communities' involvement for effective integration of their responsibilities into formal procedure.

The analysis of the results indicated that 87% of the surveyed teachers have experienced at least one earthquake, which is expected due to Greece's high seismicity (Figure 1). That is expected because it is well known that Greece is the country where the 50% of the European seismic energy is released.

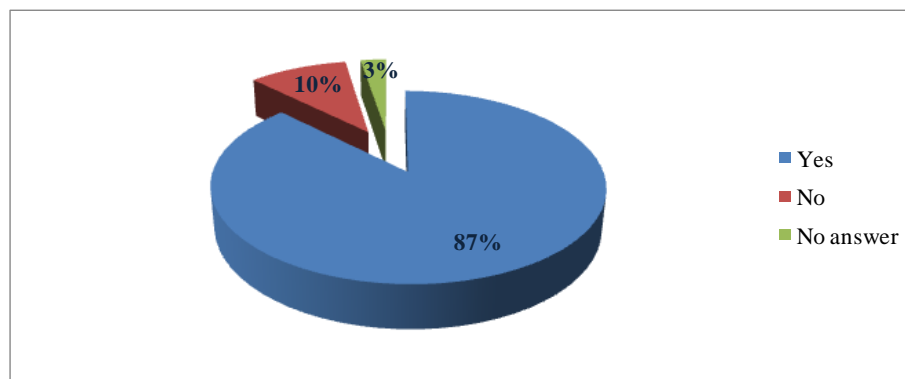


Figure 1. Have you ever experienced an earthquake?

Similarly, state of knowledge of the responders on earthquake protection measures is very high (87%), which is due to continuous EPPO communication efforts since its foundation in 1983 (Figure 2).

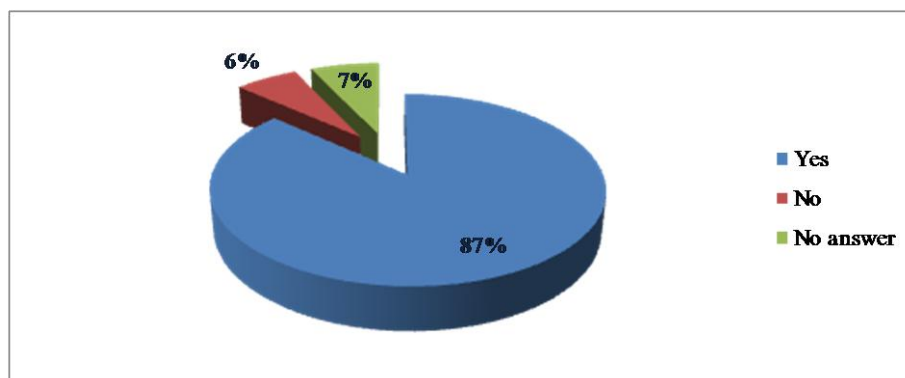


Figure 2. Are you aware of the earthquake protection measures in case of an earthquake?

A significant majority of the responders were reported being familiar with the preparedness procedure that is recommended, at individual and family level, such as: household disaster plan and family reunification plan. However, despite the above positive data, it is mentioned that 28,86% of the

responders have not selected an open, safe place to meet with the members of their family in case of earthquake. Additionally, 26,09% of them have not fastened properly tall and heavy furniture at home.

Furthermore, one of the most disturbing statistics we uncovered was that a substantial percentage of responders haven't been familiar with the standardized protection measures and behaviors during the shaking. The analysis of the results indicated that 920 out of 1587 responders (57,97%) consider "cover under the door frame" as the proper self-protection action during the earthquake, while the 48,20% (765 out of 1587 responders) would remain still (doing nothing) during the shaking (Figure 3).

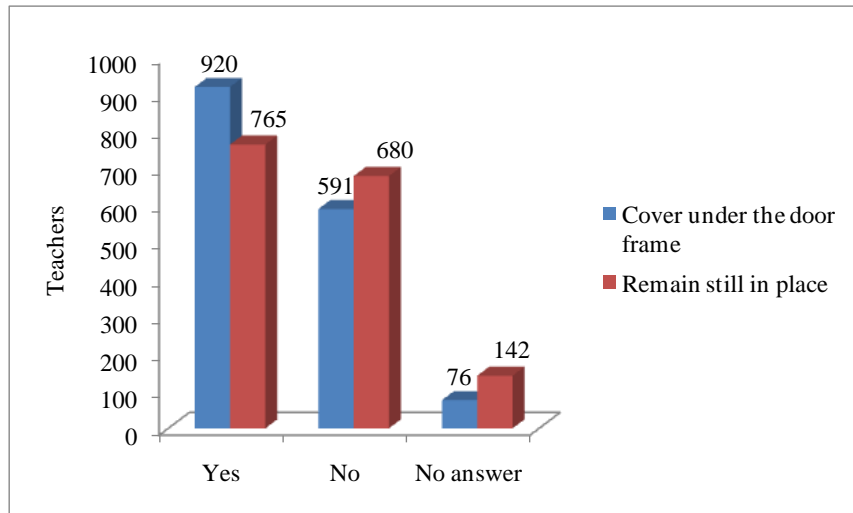


Figure 3. Do you consider: "cover under the door frame", and "remain still in place" during the earthquake, as proper self-protection actions?

The research showed that 42,84 % of the responders seek information about earthquake safety, on the internet. This information seeking process may be proved misleading, regarding the fact that a significant amount of inaccurate and false information circulates on the internet, about earthquake protection issues. For this reason, EPPO's webpage was reformed and updated to provide visitors with a more user-friendly environment. Moreover, new units such as FAQs, current activities and best practices on earthquake protection in the form of videos, CD-ROMs, articles, etc., were added.

To ensure that population is adequately prepared for a case of earthquake and has taken specific measures such as: identification and reduction of non structural hazards at home, development of a reunion plan with family members etc., EPPO developed a series of four TV social messages each of which focused on different proactive actions. More specifically, the proactive actions advertised were related to development of family emergency plan, fastening furniture at home to prevent potential damage, "drop, cover and hold on" behavior during an earthquake, and using stairs instead of elevator after the earthquake during the evacuation of the building.

Furthermore, EPPO published last year a new leaflet under the title "Get Ready for the Earthquake" (EPPO 2013), aiming to encourage and motivate citizens to contribute significantly to family wellbeing and self-protection in the face of potential and actual earthquake disasters (Figure 4).

. Additionally, EPPO organized a public information campaign in collaboration with the Company of Means of Transportation, in order to build awareness towards earthquakes and establish a preparedness status for prospective earthquakes at individual and family level. During a three months period, in the central station of Athens subway (station Syntagma), exhibition posters were installed and leaflets were disseminated to inform passengers about earthquake protection issues.

It is worth mentioning that short before Kefalonia destructive earthquake at January 2014, EPPO published a leaflet titled "Protective Measures - Post Disaster Period" aiming to inform earthquake victims about proper actions and behaviors during the immediate post disaster period (EPPO 2014). Analytical guidelines and recommendations are provided on ways to support parents' and teachers' important roles in disaster recovery to provide emotional support and responsive disaster education to children after disasters. Children affected by disasters have been found to be at higher

risk for mental health issues such as post-traumatic stress disorder and childhood traumatic grief, behavioral issues such as increased aggression, delinquency or withdrawal, and declining academic performance (Peek 2008, Peek and Richardson 2010). There is a growing body of research on children affected by disasters, and the use of school teachers as psychosocial mediators in communities directly impacted by disasters (Baum et al., 2009, Cohen and Mannarino 2011).

The recent disastrous earthquake and the strong aftershock sequence at Kefalonia, demonstrated that EPPO's education efforts on earthquake protection were more than efficient. According to the review data there were neither victims nor injured people, because the population and mainly the children were informed about the proper actions in case of an earthquake. In some cases reported that children had more appropriate behaviour during the earthquake than their parents.

It is worth mentioned that during the 2014 Kefalonia Earthquake a lot of heavy unanchored or poorly anchored nonstructural contents, proved to be the most vulnerable items. Due to high earthquake acceleration, televisions, computer monitors, countertop laboratory equipment and microwaves fell and broke at houses and work places. Tall slender shelving, bookcases, or file cabinets overturned during the earthquake. These items were particularly hazardous in case they were located adjacent to a desk, bed, or near doors, corridors and exits. Damage to windows and glazing failures were relatively common, often causing hazardous conditions on sidewalks in urban areas. The damage to fallen or broken items added to property loss and downtime.

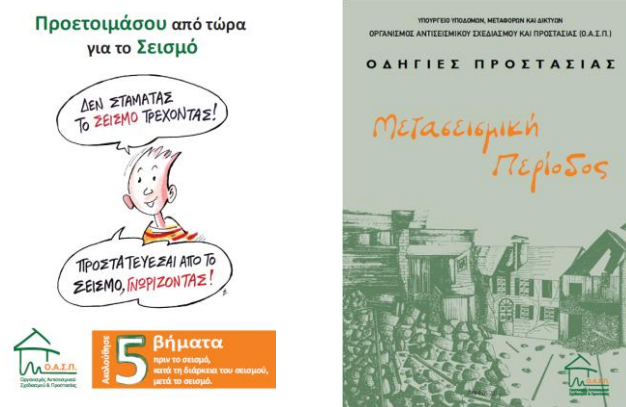


Figure 4. a. EPPO leaflet "Get Ready for the Earthquake" b. EPPO leaflet "Protective Measures - Post Disaster Period"

## SEISMIC SAFETY AT SCHOOLS

In Greece school disaster management is established via national education authorities and local school communities (including teachers, children and parents), working in collaboration with their disaster management counterparts at each jurisdiction, in order to maintain safe learning environments and plan for educational continuity, conforming to national and international standards.

Analysis of the results revealed that 15,82% of the responders were not aware of their school Emergency Plan or they claimed that such a Plan does not exist at their schools (Figure 5).

To adapt standard operating procedures at school community, EPPO developed a Model School Emergency Plan which is a flexible, but standardized operational template to facilitate schools prepare for, respond to, and recover from earthquake disasters that may occur within their area (EPPO 2012). This Model School Emergency Plan was notified to Hellenic Ministry of Education which in turn communicated it to all public and private schools of the country. It's also posted on the "Greek School Network" website, to facilitate access.

It is well known that reduction of seismic vulnerability at school community depends not only on the formulation of written emergency plans but most importantly on implementation of drills, which provide an opportunity to put into practice and evaluate the effectiveness of the "written plan". With regard to this, at least 19,85% of the responders reported that they don't hold Earthquake Drills at school every year, although School Principals are legally responsible for school emergency planning

and implementation of at least three drills per year (GSCP 2012). Additionally a number of 130 teachers (8,10%) selected “no answer”, which easily is interpreting in either “no” or “don’t know” answer.

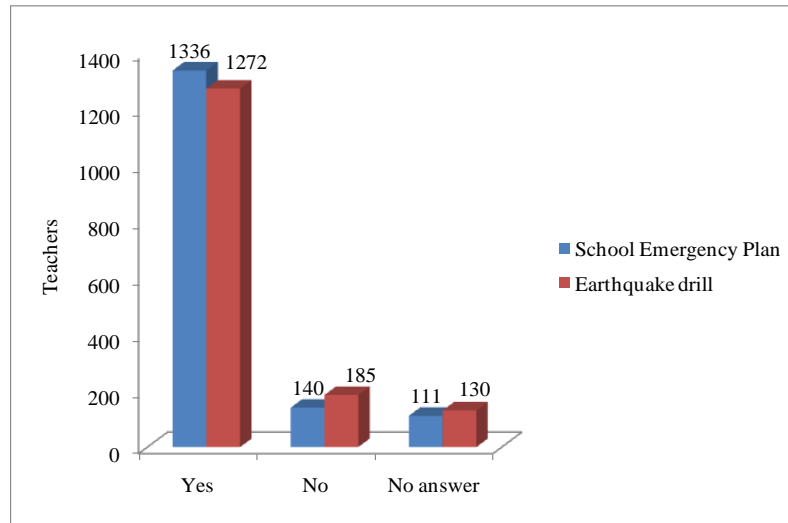


Figure 4. a) Does your school have a Disaster Emergency Plan? b) Do you hold Earthquake Drills every year?

To facilitate the action-planning for ongoing disaster risk reduction and the implementation of earthquake drills at schools, EPPO in collaboration with Hellenic Ministry of Education decided to establish a specific day, for schools' every year first earthquake drill. This day is the 13th of October, that has been established as the International Day for Disaster Risk Reduction (UN 1998). The effectiveness of that action was impressive according to the outcomes. The current year a vast majority of schools complied with the proposed instruction and have already held earthquake drill. Furthermore, that specific day, number of EPPO's website [www.oasp.gr](http://www.oasp.gr) visitors increased by 180%.

Schools' seismic safety of Kefalonia region, has been EPPO's principal priority. Soon after the main shock, several programmes were addressed to school community, aimed to comfort children's fears and depression caused by the strong and continuous aftershock sequence. The earthquake and school closures contributed to an unprecedented unrest to student's families and the local community. For this reason during the first 2 weeks after the earthquake, nearly 6.000 students of 70 primary and secondary schools were informed by EPPO's scientific personnel. In addition, EPPO staff discussed with the approximately 500 teachers of Kefalonia and Ithaka islands to empower and encourage them, in order to help their students and themselves to cope effectively with the adverse effects of aftershocks.

## CONCLUSIONS

It is well known that priorities for action, in order to achieve a comprehensive individual, family and community safety are to use knowledge, innovation and education to build a culture of safety, to reduce the earthquake risk factors and to strengthen earthquake preparedness for effective response.

The last decade in Greece, a lot of State's initiatives have been done to develop countrywide public awareness strategy to stimulate a culture of disaster resilience, with outreach to urban and rural communities, includes man-centered elements. Comprehensive family and work place safety is addressed by education policy and practices aligned with disaster management at national, local, family site levels. In that framework: 1) Disaster and emergency plans are in place at all levels and training drills are held to test and develop disaster response capacity at all levels 2) School disaster management policies and plans are implemented to reduce the vulnerability of children in and out of school 3) Information campaigns and educational materials on earthquake risk reduction are shared nationally, and are available for all target groups of population.

According to the results of the present survey a significant majority of the responders were reported having experienced an earthquake, being familiar with the standardized procedures that include prevention and protection behaviors, as well as response and mitigation actions at individual, family and workplace level. However, the results also indicate that there is a substantial percentage (57,97%) of responders that have misconceptions about the recommended protection behaviors during the shaking.

Concerning the school environment, results revealed the effectiveness of emergency management/response of school community in an event of an earthquake. A high percentage of surveyed teachers reported having taken the appropriate preparedness measures concerning non-structural hazards at schools, having an emergency school plan, holding earthquake drills every year. Although, besides the promising answers there is still a number of schools that don't hold earthquake drills every year.

It is worth mentioning that even though in Greece many efforts have been done till now, to build awareness towards earthquakes and establish a preparedness status for prospective earthquakes within the family, work place level and school community, there are still actions to be taken in order to identify gaps on the education procedure and needs of different target groups, and to define new goals and efforts that will work more effectively to: 1) improve general population' ability to plan or implement actions concerning earthquake reduction issues at family and work place level, 2) increase school preparedness and ensure emergency response, towards safety and welfare of students, school staff, visitors and school property.

Achieving improved seismic safety is not only a problem but also a challenge to prompt community engagement, accountability and action.

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